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THE WORLD'S FASTEST SELLING AIRPLANE

Southern Flight

NOVEMBER, 1937 VOL. VIII. No. 5

The complete monthly digest of aeronautics in the South and Southwest.

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THE COVER: "Student Pilot." The subject is Thurman Braniff of Oklahoma City, nineteen year old son of Tom Braniff, president of Braniff Airways. The ship is a Taylor Cub. Young Braniff, who is following in the footsteps of the "old block," expects to follow commercial aviation as a profession. He will soon have his private pilot license.

★ ★ ★ ★ ★ Just Among Ourselves ★ ★ ★ ★ ★

Civil Air Regulations

THE inevitable revision of the 1926 Air Commerce Act at last has taken place. Whether or not the amended regulations in their entirety are reasonable or unreasonable, fair or unjust, harmful or helpful, will be known only when they are finally published, given broad dissemination and put into force. Until that time we must be content to accept the growing confusion generated within the flying fraternity by the new regulations.

One thing sure, we all might as well relax and take it, and diligently apply ourselves to learning the revisions as soon as they are made available to everyone by the Bureau of Air Commerce. The medicine has been coming for a long time, what with the growing number of infractions from shenanigans and illegal practices going on with the familiar nose-thumbing attitude, too obvious to disregard.

Should the new Civil Air Regulations seriously injure private, non-commercial flight and curtail non-scheduled operations, the flyers themselves are largely to blame. In the first place the dangerous minority who have been getting by with murder must be flagged down by authority. The saner flying folk, who live within the law and closely observe existing regulations, have kept their hands washed clean of our more irresponsible brethren, who have been taking the route of every man for himself and the devil take the hindmost. Unfortunately, even the sane flight regulations are too difficult to enforce because there aren't enough "policemen" to catch the culprits; and one damned fool can do the business as much injury as an unjust Department of Commerce regulation. Of late, the damned fools have gone serenely on with little or no interference from anyone.

In the second place, private flying and fixed-base operations, without strong unification or concentration of energies, have to take what is handed them. These two phases of flight have little or no voice in the creation or formation of new regulations. So, in the final analysis, they can lay a good portion of the blame upon themselves for any plight created by change. They prefer to shut the barn door after the horse has escaped.

It seems to us that the new Civil Air Regulations are the result of other factors as important and apparent as furnishing the necessary curb and stoppage of illicit operations. The air line operators, strongly organized, wisely look out for their own interests. Increasing traffic of the skies does present a constant hazard to their scheduled operations. They hardly can be blamed for looking after their own investments and selfish interests. Further, we presume that the Bureau is sick and tired of all the blame that has been heaped upon their sore backs for all kinds of mishaps and irregularities within domestic civil aeronautics. The revised regulations will give the Bureau a come-back and defense as well as an increase in its power and prestige; for the most minute detail of practically every phase of flight has been thoroughly covered. More than ever before in its history, the Bureau will be the "big boss" of the civil airways.

Hence, with a little reflection, we can show but little surprise or wonder at the natural developments now taking place in Washington. Whether it means serious and crippling over-regulation, whether it results in closer protection or near annihilation of the "average" pilot and owner and whether those most directly involved must stand behind or fight against the revisions, remains to be seen after the new regulations become operative. With such sweeping revisions, which at the moment ap-

pear to be empirical remedies, there's bound to be a mixture of good and bad together with an extended period of readjustment which will require a lot of patience and intelligent thinking on the part of every individual conscientiously interested in the continued healthy growth of civil aeronautics in the United States.

A Permanent Airport Program

HIGH ranking Federal aviation officials have just completed a three weeks nation-wide survey by airplane of some two score WPA airport construction and improvement projects. Not only did they inspect millions of dollars worth of new facilities in every section of the nation, but they sat down and talked over with city officials and civic leaders the various problems and necessary work facing far-sighted municipalities.

The WPA and Bureau of Air Commerce officials together with the president of the National Association of State Aviation Officials and representatives of other aviation agencies who made the survey trip, amassed a lot of valuable information which can and possibly will be put to good use in sponsoring a permanent Federal airport development program, similar to the work being done by the Bureau of Public Roads in highway improvement.

The inevitable curtailment of Federal relief expenditures, the growing reluctance of municipalities to shoulder the entire expense of airport construction and improvement, coupled with the lack of authority within the Bureau of Air Commerce in this phase of aeronautics, leaves us without any agency to carry on the necessary expansion program throughout the nation. From now on the problem will become more and more serious unless an independent Federal agency with ample appropriations is immediately established along the lines of and with functions comparable to the Bureau of Public Roads.

A permanent airport development program must be forthcoming in order to carry on the good work made possible in the last few years by Federal relief money. It would require but a couple of years inactivity to antiquate many facilities that seem adequate today. Ground facilities must not only keep up with but stay one jump ahead of technical improvement of aircraft. They are neck and neck at the present moment and when the WPA money stops coming in, we'll have some aircraft that can't be flown because there's no place to land.

The Bureau And Personnel

IF any large business or commercial enterprise had as many personnel and executive changes as our Bureau of Air Commerce has had in the past five years, they would probably end up under the hammer. Consequently it is logical to believe that a great portion of the Bureau's inefficiency and internal strife may be attributed to this personnel instability, the root of which is deeply set in the ground of petty politics.

The third director of the Bureau within a year is soon to be appointed, following the recently announced resignation of Professor Fred D. Fagg. No sooner does the Bureau presumably clean house and put into effect a complete reorganization that offers new hope to a harassed industry, than announcement comes of another upheaval in personnel. We are prone to believe that the trouble is not so much with the men who are chosen from time to time to fill important posts, but rather with Secretary of Commerce, Daniel Roper, and his non-flying, right hand bower, Col. J. Monroe Johnson. It stands to reason that if they knew anything about their executive positions and honestly desired progress and harmony, the Bureau of Air Commerce would today approximate the NACA in character, for the NACA has no politics and its personnel are chosen for their ability only and not for feathering the political nests of pork barrel politicians. That's why it does a clean job.

Fortunately, the men with the Bureau in the field are relatively safe from continual hiring and firing when we compare their situation to that of their bosses. Nevertheless they are also vulnerable under the existing system and a few personnel practices from above could easily be applied to the field, which would indeed bring chaos to the administrative functions of the Bureau and to the aviation industry as well. Civil service with guaranteed lifetime jobs to capable men is the only solution to the Bureau's personnel problem. Someday the Congress might wake up and admit it.

When Winter Comes

THROUGHOUT the past twelve month period we have read the official accident reports of the Bureau of Air Commerce with more interest than ever before. What with intense congressional attention to air safety, the new system of accident investigation, and the subject of air safety on the minds and lips of the man in the streets, the subject of air accidents is almost as widely discussed as the gory subject of highway accidents.

Spectacle rather than fact, however, has been the reason for so much emphasis on and interest in air mishaps. The unfortunate series of accidents that occurred within the space of a few weeks last winter had more to do with this wide publicity than any other one factor. Traffic figures were seriously affected in spite of the fact that the period was one of the safest from the standpoint of passenger miles flown per fatality. Nevertheless, the public mind determines the traffic figures. And the public shied off last winter following the series of crack ups. What they demand is a higher degree of safety than has been enjoyed in the past. Engage any average air traveler in conversation and he will freely admit a major accident has a definite effect on him for a while. He is sold on air transportation but nine out of ten will tell you they have confidence in every phase of air line operation except when weather is bad. With sharp interest they read about the accidents, form their own opinions and draw their own conclusions. If most of the accidents occur in bad weather, they can't understand why a line will take any chances at all.

There are, of course, many veteran air travelers who howl their heads off when a schedule cancels out on account of weather. But there are undoubtedly more who feel under the circumstances that the operator is acting judiciously and conservatively.

The industry no longer dodges the question and problems of air line safety, nor the psychological reactions of the public to accidents. They realize that another series of fatalities this winter will be a blow from which it will take a long time to recover. Cancelled schedules will mean less passenger miles and curtailed revenue but the air line operators are proceeding with utmost caution this winter, fully cognizant that the public mind is more sensitive now than ever before and have this winter's operations under close scrutiny.

After all, weather is still the greatest problem facing scheduled operations. Government facilities are being improved, and although the technicians are working night and day on icing problems, anti-static radio equipment and revolutionary flight instruments, we have not arrived to the point when we can say old man weather has been whipped. Until that time comes, we'd better stay out of the storms and the mountains.

Air Corps Automatic Landing System

Distinct from any other so-called automatic systems, this Wright field development permits landings without human hands or remote control from the ground.

Capt. Carl J. Crane
and
Capt. George V. Holloman

MUCH has been written in recent months concerning the personal equation during flight and the influence of this equation on accident rates. The newer developments in modern aircraft, to insure high performance, have required an increasing number of cockpit devices, all of which demand the attention of the pilot at some time or other during any given flight.

Pilots have felt and expressed the need for simplification of the various controls that must be manipulated and have expressed the need for this simplification in no uncertain terms. This simplification means that many of the functions now performed by the pilot in flight control and navigation must be done automatically. The landing of aircraft is no exception to this general trend. With this in mind, the personnel of the Materiel Division over two years ago began active prosecution of development work to simplify the procedure of instrument landing by making it automatic.

For over a year Air Corps test airplanes have been flown automatically over distances that have indicated the thorough reliability of the devices employed. This was one step in the perfection of automatic landing. The features therefore that are built into the automatic landing system are not only useful for the landing but are used throughout the entire flight of the airplane across the radio navigational aids with which the United States is provided. Test airplanes from Wright Field have been flown automatically from Wright Field as far as Texas and return under automatic control. Several flights have also been made from Wright Field via Buffalo, New York, to Newark, New Jersey, and from there via Langley Field, Virginia, to Wright Field, Dayton, Ohio. Obviously the automatic landing involves other factors besides control of direction. These factors are control of altitude, engine control, glide control and further engine control after landing.

With the provisions of the Air Corps automatic landing system in an airplane and with the installation of the new "Z" type radio range beacons, the airplane may be flown automatically from station to station, from East to West Coast. If we imagine a group of the future "Z" type radio ranges placed in a line joining the runway of the landing field and extending to a point five miles therefrom, some idea will be gained of the essential features of the Air Corps automatic landing system. By reference to Figure 1 which represents the path of flight and landing made by the Army C-14 Cargo airplane on Monday, August 23, 1937, a generally clear idea will be obtained of the path of the airplane in the horizontal plane. Figure 2 represents a vertical view of the airplane flight path and landing path which the Army airplane followed in executing what is believed to be the world's first entirely automatic airplane landing. The two diagrams above mentioned should be self-explanatory and in themselves are evidence of the continuation of development on the Air Corps system of instrument landing.

On Monday, August 3, 1937, after over two years of intensive research and design with respect to automatic control features and automatic flight procedure, two entirely automatic landings were made in the period of an hour under adverse air and wind conditions by Captain Carl J. Crane, Director of the Instrument and Navigation Laboratory, and Captain George V. Holloman, Assistant Director of the Laboratory, and Mr. Raymond K. Stout, project engineer in automatic landing. Since that time additional landings have been made in which disinterested personnel have been carried as observers on the flights in order to check the various factors entering into the fully automatic landings performed.

IN THE execution of an automatic landing, using the Air Corps system, it is necessary for the pilot of the airplane to bring the airplane to a definite altitude, determined by the sensitive altimeter, and to place the airplane within the range of radio reception of the ground radio facilities. It is, of course, desirable to place the airplane generally in the direction in which it is expected to land, but this is not necessary as was determined in flight and can be understood by reference to Figure 1 in which the airplane was actually placed in a position which headed it 180° *away* from the direction of final landing. When the pilot has placed the airplane at a selected altitude in the vicinity (20 miles or less) of the landing field, the master landing switch is closed and the airplane proceeds through the following routine in accomplishing the automatic landing:

a. The selected altitude is automatically maintained and the airplane's heading is changed so that it flies in

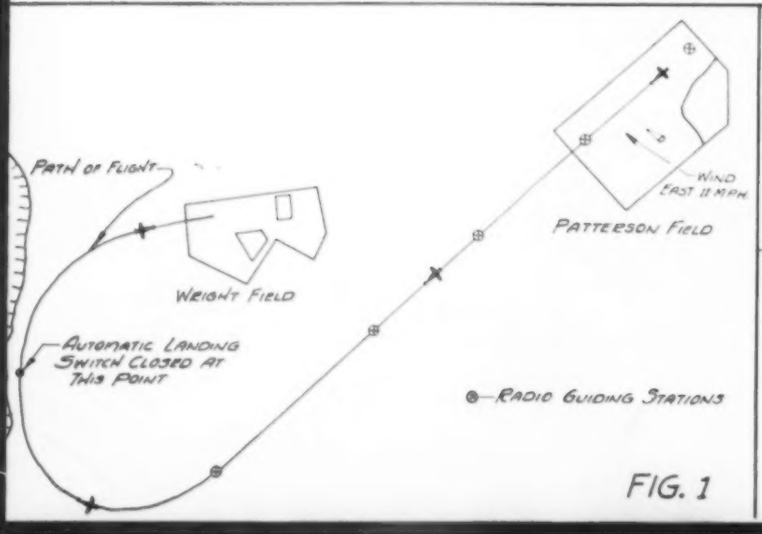


FIG. 1

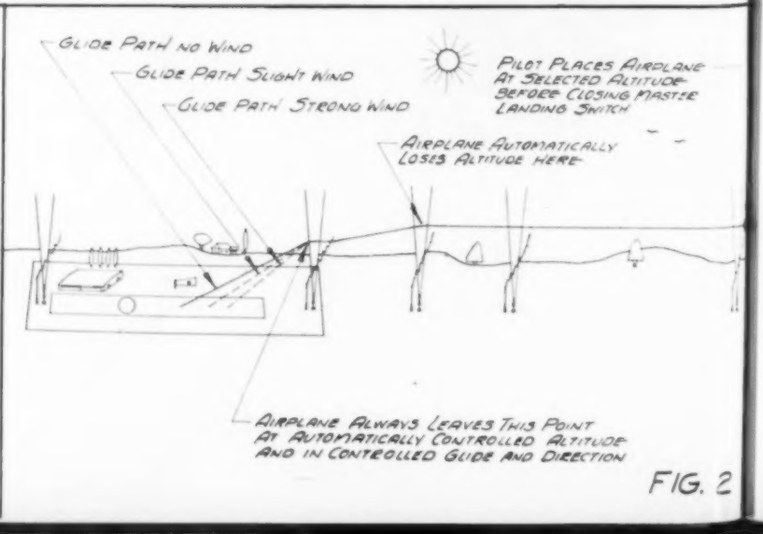

GLIDE PATH NO WIND
GLIDE PATH SLIGHT WIND
GLIDE PATH STRONG WIND
PILOT PLACES AIRPLANE AT SELECTED ALTITUDE BEFORE CLOSING MASTER LANDING SWITCH
AIRPLANE AUTOMATICALLY LOSES ALTITUDE HERE
AIRPLANE ALWAYS LEAVES THIS POINT AT AUTOMATICALLY CONTROLLED ALTITUDE AND IN CONTROLLED GLIDE AND DIRECTION

FIG. 2

the direction of the radio guiding station most remotely located from the landing runway.

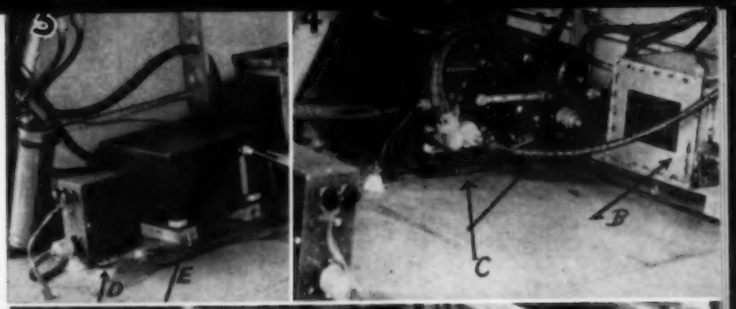
b. The altitude control device shown in Figure 3 maintains the proper altitude during the initial approach as just noted. The directional relay, which interlocks the radio compass and the gyro pilot and which therefore causes the change in heading of the airplane, is shown at "B" in Figure 4. Adjacent to this relay is shown the radio compass marked "C," the frequency of which is automatically set by the interaction of the marker beacon receptor "D" working in conjunction with the frequency selector "E." (Fig. 3.) The pilot of the airplane is informed as to the correctness of automatic settings by observing the frequency selector indicator "F" (Figure 5). Through the automatic and cooperative action of these devices, the airplane heads to the compass guiding station farthest from the field as shown in the diagram. Upon reaching that station the frequency is automatically changed to Station No. 3 where it is again automatically changed to the frequency of Station No. 2 where the frequency is again automatically changed to that of Station No. 1 while at the same time the engine throttle is automatically operated by the throttle engine shown at "G," Figure 6, and again shown in "H," Figure 7. The throttle engine is interconnected with the altitude control in such a manner that should the airplane reach its minimum altitude prior to reaching radio station No. 1 the throttle engine will be so actuated to control the airplane in such a manner that it will maintain accurately the minimum altitude required for the operation of the automatic landing system. After passing Station No. 1 the throttle engine is so actuated that the airplane maintains a selected glide angle and rate of descent until ground contact is made, the throttle engine is further actuated by the landing gear switches, one of which is shown at "I" in Figure 8 which in turn causes the engine to be idled and proper brake application made.

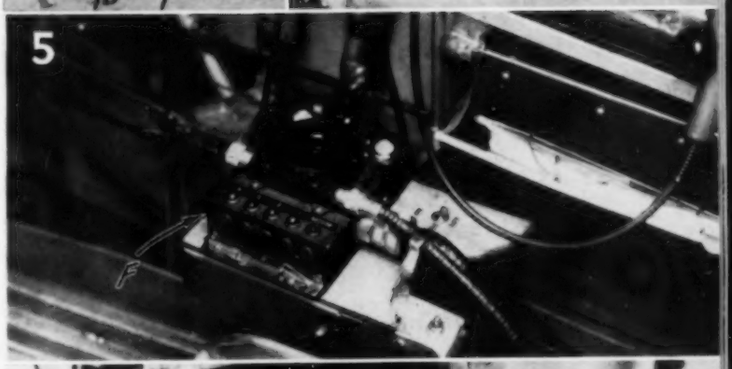
At the present writing, the automatic landing system has been flown so that all of the landings made to date have been made under cross wind conditions varying in intensity as high as eleven (11) miles per hour. In at least 50 per cent of the automatic landings made, the air conditions have been moderately rough.

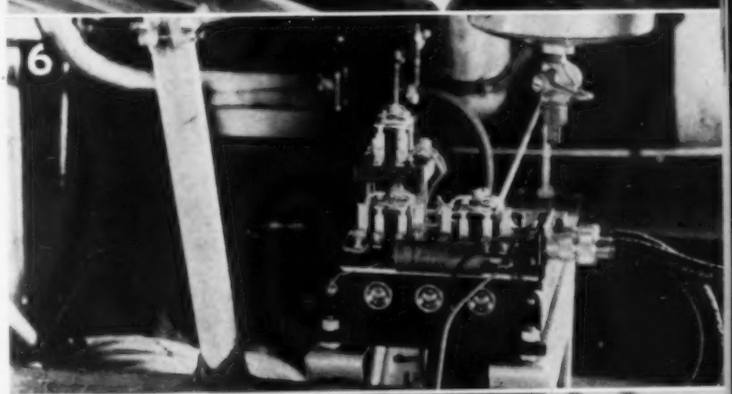
THE Sperry Gyro Pilot has been used throughout as the automatic flight control feature of the airplane. Certain additions to the Sperry Pilot have been required in order to provide for the automatic control of direction. Figure 9—"J" shows the Sperry Gyro Pilot installation. In Figure 9 is shown the master landing switch No. 1 and the auxiliary reset switches 2, 3, 4 and 5.

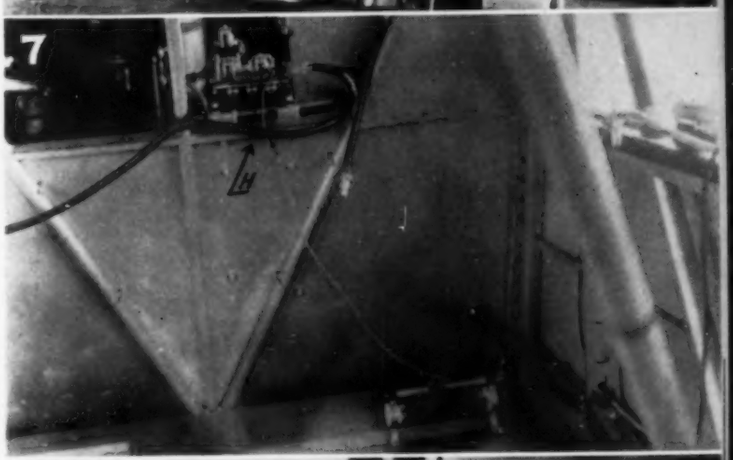
The series of tests conducted through the last two years have brought many humorous incidents not the least of which have been such terms as "nervous shoe laces" and "jittery hands" which have always been evident to the observer watching the pilot keep "hands off" during the automatic landings.

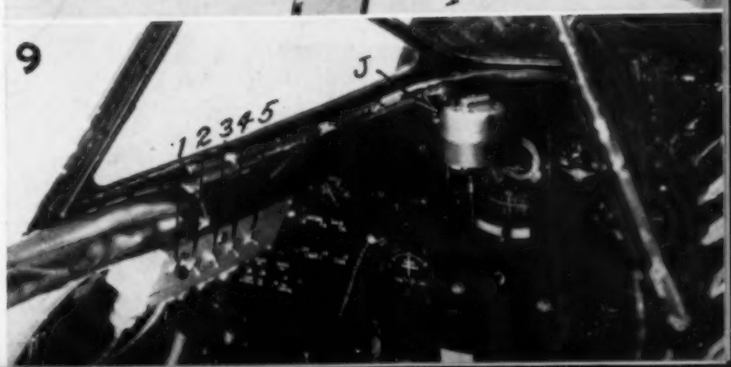
The automatic landing system was designed by Captain Carl J. Crane, Director of the Instrument and Navigation Laboratory at Wright Field, and working with him, Captain George V. Holloman has conducted practically all of the flight tests which have brought to a successful conclusion the automatic landing system. The various units of automatic control were designed by the above noted officers, Mr. Raymond K. Stout, project engineer, and Mr. C. D. Barbulesco of the Signal Corps Aircraft Radio Laboratory, which laboratory assisted materially in the design and construction of various units entering into the automatic landing system.











The Club Plan Works

It provides flight instruction at reasonable rates and guarantees the instructor regularity of income with planned training appointments.

Lou Foote

THE past two years in civilian aviation can honestly be termed the light plane era. For during that period of time light planes have taken the airports over the nation by storm. Not since the "boom" days before Uncle John Depression paid us an extended visit have there been so many wings in the air and it's the fellow of modest means who is largely responsible for the increased activity. His re-entry into the aviation picture has been made possible by far-sighted light plane manufacturers who not only have made airplane production history by providing and marketing honest-to-goodness airplanes at a volume production price, but also have opened the gates to thousands of people who before could not pay the price of admission. And the light plane purchaser is getting a lot of safety, efficiency, economy and utility for his money.

Mr. and Mrs. Lou Foote
Pioneer lightplane distributor in the North Texas region, Lou Foote maintains a base on Love Field, Dallas. Foote was an early-day air mail pilot for N. A. T., and his wife, the former Jean LaRene, was the seventh woman in the United States to receive a transport license which she still holds.

Likewise, the fixed-base operator has profited by the light plane's successful development. His has been the job of distributing and selling. In addition, the light plane has opened up new channels of flight instruction by virtue of the fact that both original cost and operating costs are low and the substantial savings are passed on to students.

Not so very long ago a Club plan was conceived whereby flight instruction costs could be cut to a point that permitted a new, moderate "income" class of individuals to learn to fly. They came from a category that had not previously been within the reach of the former, necessarily high-priced instruction prior to the light plane era. Under the Club plan, students budget their income to include flight training, eliminating a great deal of the haphazard "fly when I can" business. A year's membership calls for an initial fee of $30 and dues of $5 per month. Students then can receive flying time at the low rate of $3 per hour. Most participants in the Club plan rarely drop out, either from fear of losing their original investment, which tends to hold them, or from the very fact that by budgeting their income they pay their dues and hour time much the same as they do a utility bill.

Not only does the Club plan attract more students but we also find that each individual flies more times per week at the $3 rate than on the straight time basis. This volume is beneficial not only to the students but to the instructor. If the student takes fifty hours during the year, his per hour cost of instruction and solo flying, including original fee and monthly dues, amounts to only $4.80. Should he take a hundred hours, the cost drops to $3.90 per hour. We feel that with the present light plane equipment on the market, an operator can make more money under the Club plan than on a higher priced straight time basis. We have trained 180 students on the plan and all of them have received utmost satisfaction from their participation.

Another element that enters into the Club plan is that of potential sales. By providing more instruction to more individuals, a larger percentage of new prospects for airplane sales is the natural result. We have sold thirty-one of these light planes in less than two years, with the greatest proportion going to students in the Club. The time-purchase plan inaugurated by the Taylor Aircraft Company has also been an assisting factor in many instances.

The Club plan brings the students together in closer daily contact and provides an opportunity for congenial get-togethers such as short training flights, "sunrise" breakfast flights and "dawn patrols." Participating in one of our recent early morning patrol flights over the city of Dallas were a dentist, an electric company employee, a college student, a cotton gin employee and a lawyer, which illustrates the wide range of professions and pursuits from which we draw our students for the Club organization.

IN regard to the exceptionally dependable service and operation of the "new era" light planes, our own experience is significant. We accepted a Taylor Cub distributorship in April, 1935, and purchased one of the 1935 Cubs. In fifteen months time we had put over 1280 hours on the ship, then sold it to a pilot who has since added over 700 additional hours. It is still going strong with plenty of good serviceable hours left. This was the original ship with which we inaugurated our Cub Flying Club.

Although we carry on advanced training in higher powered ships, which include a Stinson, a J-5 Travel-Air, a Rearwin Ken-Royce and a Swallow, most of the time dispensed is on our little fleet of Taylor Cubs. The students have no trouble whatsoever in switching and graduating to heavier equipment. Hence it is we have come to learn by experience that the modern light planes are full-fledged aircraft and can no longer be placed in the "powered glider" class as they were almost universally termed a few years ago.

The Lambert Projection

Some important aspects of a map projection widely and successfully used in modern air navigation

Lt. Comdr. P. V. H. Weems
U. S. N., Retired

THE solution to all problems of dead reckoning depends entirely upon the projection of the map employed. For cross country navigation work the Lambert conformal conic projection is well suited to the needs of the aviator. This projection was devised nearly 200 years ago but did not come into prominence until the World War. At that time it was adopted for the military maps of the Allied Forces because it afforded a maximum accuracy of distances and directions, the two basic problems of all navigation. It is these two factors that definitely determine position.

The Lambert projection affords a remarkable combination of properties and advantages, among which are the following:

1. Any number of charts may be fitted together and will match perfectly in any direction.
2. It is unexcelled for scaling distances in all directions over most areas.
3. Directions and azimuths conform very closely to true directions on the earth, i. e., great circle directions.
4. It provides the best possible chart for piloting or flying by landmarks.
5. It affords a simple and satisfactory solution for all problems of dead reckoning, not excepting the rhumb line.
6. It affords the simplest possible means of practical great circle navigation.
7. It is unsurpassed for all types of radio navigation.
8. It is unusually suitable for celestial navigation and all problems requiring the plotting of positions.

These conclusions have been reached as the result of many practical tests.

In the Lambert projection, the meridians of the earth are represented by straight lines converging toward a common point outside the borders of the chart and the parallels by curved lines which are sections of concentric circles whose center is at the supposed point of intersection of the meridians. Meridians and parallels intersect at right angles and the angles formed by any two lines on the earth's surface are correctly represented.

The scale error of any single chart is so small that distances may be measured directly by means of the graphic scales printed on the borders. On a chart of the United States as a whole, the maximum (total) scale error is within one-half of one per cent—an error quite negligible in practice.

In view of these advantages of the Lambert projection, the U. S. Coast and Geodetic Survey chose it for the construction of the Department of Commerce Sectional and Regional Charts. The 87 sectional and two regional charts have been completed while work is underway on additional regional charts.

The principle of the Lambert chart is shown in Fig. 1. The Mark II Aircraft Plotter is designed especially for use with these charts and has both the 1:1,000,000 and

(Continued on Page 26)

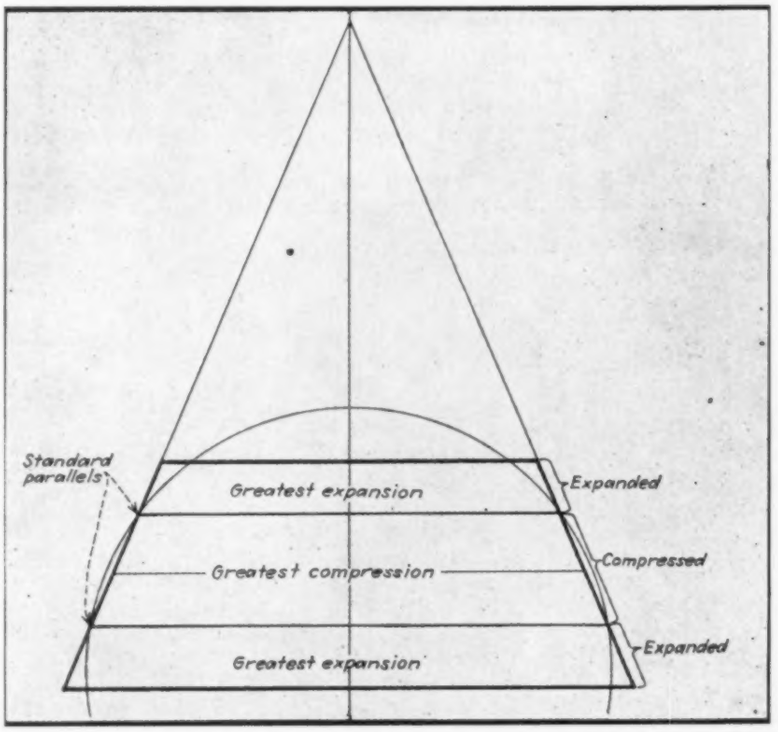


FIGURE 1

FIGURE 2

FIGURE 3

The Blimps Carry On

With a remarkable safety record behind them, the Goodyear fleet continues to barnstorm the country in the interest of lighter-than-air

C. I. Merrell

AFTER twelve years of highly successful operation in this country the Goodyear blimps have become an accepted institution in American aviation progress. Without fanfare or spectacle the fleet of airships since 1925 have carried 265,000 passengers in perfect safety and travelled more than 2,250,000 miles. Flights have been made in Canada, Mexico and Cuba and in thirty-six states of this country.

To the uninitiated observer the sight of one of the blimps in flight leaves the impression that the diminutive airships are mere novelties for the purpose of providing thrills. But this conclusion is far from true. After more than a decade of hard service over mountains and plains and through severe storms and gales the blimps have come through to prove themselves more than mere toys.

The financial outlay required and the ultimate goal of the Goodyear-Zeppelin Corporation preclude the thought of keeping five airships in operation over the country merely to amuse the public. Although no exact figures are available it is estimated that nearly $1,500,000 has been invested in the equipment now operating together with all accessories and training of personnel. Naturally this expense and planning revolves about a long time program of airship development in this country.

Despite disappointments and heartbreaking reverses in recent lighter-than-air history, the Goodyear concern is looking forward to the day when the airship will take its rightful place as a vehicle for long range transportation of passengers and cargo. With this thought in mind every means is being utilized to keep a nucleus of skilled workmen and engineers active in the manufacturing division on the construction and maintenance of the blimps. Of equal importance is the necessity of having available a large personnel of skilled pilots and crew members whose training requires a period of years. At the present time a total of twenty-two pilots are on the payroll and some of these have had as much as ten years of lighter-than-air experience.

The airships themselves provide valuable testing laboratories for materials, valves, controls, engines, fuel, etc. The varied conditions under which the blimps are operated provide a wide range of experience for the crew and ground personnel. The very important education in operating through a multitude of weather conditions is gained by the pilots and the meteorologists who are members of the staff.

From the educational standpoint the blimp has been an important aviation selling factor. It is estimated that about seventy per cent of the people riding the airship have never been in the air before. For practically all of these the safety and pleasure of flying becomes at once apparent. Many people who have an exaggerated fear of height gain enough courage to take a blimp ride and completely overcome their mania. It is not uncommon for a passenger to alight from the blimp and arrange for an airplane ride. For instance, a business man in Chicago had always been interested in air travel but felt he couldn't stand the altitude. After taking a blimp ride he made reservations on an airline within the following week for an extensive trip.

Confidence in travel by airship has been greatly furthered by the consistent safety and wide use of the blimps. Needless to say the fare charged for a flight does not completely cover the considerable cost of maintaining a large crew of skilled men and the equipment. The difference must be charged off as a matter of advertising for the Goodyear company and to airship development work.

In addition to passenger carrying, blimps have been employed in many unusual undertakings. Among important practical applications is that of low altitude contour camera mapping. For this work a steady altitude of about 500 feet is necessary and the blimp makes a stable platform. Motion pictures have also been taken with considerable success. Deep sea fishing from the small airships has proven to be an exciting sport and takes the fish quite by surprise when lifted bodily from the water. Sign towing by blimp has proven more successful than by airplane and on a recent occasion Johnny Weismuller, famous swimmer, was towed on an aquaplane at the Cleveland Great Lakes Exposition behind one of the airships stationed there.

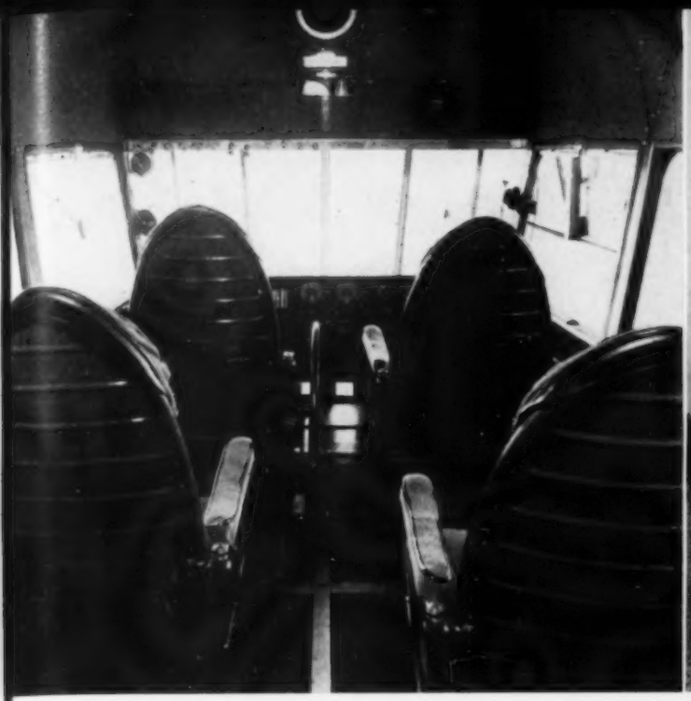
THE details of the construction and operation of the blimps make an interesting story in itself. At the outset it might be explained how the term "blimp" came about. During the Great War, England constructed several of the non-rigid airships known as the B-limp type. The word limp was employed because the airships had no stiff internal structure except for that in the tail surfaces and a nose cap. It soon came the practice to call the small ships blimps and thus the name was born.

There are in reality three classes of airships. One is the rigid type known commonly as the zeppelin. The semi-rigid type has a stiff keel structure to which the control car, nose cap and tail surfaces are attached. The term dirigible merely means capable of being steered or maneuvered and thus all types of lighter-than-air-craft just mentioned are dirigibles.

The Goodyear airship *Reliance* is a typical example of the equipment being operated. This is a new craft which was completed this year. It is 150 feet in length, forty feet in diameter and contains 123,000 cubic feet of non-inflammable helium gas. Powered with two 125 hp Warner Scarab motors, it has a top speed of sixty-two mph and cruises at forty-five mph. The theoretical ceiling is 9,000 feet and six passengers may be carried in addition to the pilot.

In charge of the ship and crew is Frank Trotter. He is an Annapolis graduate and won first place in the 1930 National Balloon Race, second in the 1931 and 1932 races and first in 1936. As co-pilot to Wade T. Van Orman in the 1933 International race out of Chicago, he landed in the northern Ontario woods and was lost for nine days before getting out safely to win third place. He has taken training at Lakehurst and served on flights on the Los Angeles, Macon and the Hindenburg.

Second in charge is Lawrence B. Furcolow, pilot and meteorologist. A West Point graduate, he has been on



Looking forward in the combined passenger and control car. The elevator control wheel may be seen at the right of the pilot's chair as well as the instrument panel and the radio installation.

The Goodyear airship "Reliance" moored to a special portable mast. Note the helium release valve on the side of the envelope and the stacks through which air is forced by the slipstream to fill the ballonets.

airships since 1929, has served on both the Macon and Hindenburg.

Pilot William N. Hudson joined Goodyear as an airplane pilot testing airwheels and holds a record of making 483 landings in a single day. He has three years of lighter-than-air service and holds a Naval Reserve commission.

John Reiker and C. W. Stacey complete the pilot staff and both have had extensive airships and balloon experience.

The envelope of the blimps is constructed of three plys of rubberized cotton fabric which are cemented together on a bias. The passenger and control car is fastened to the envelope by fabric strips cemented to the outside surface of the bag and by two catenary fabric curtains inside the envelope. The tail surfaces are of dural frame construction with fabric covering. A stiffener is placed in the nose to preserve the shape of this section.

Inside the envelope are two ballonets which are connected by two parallel ducts. These ballonets are simply partitioned air chambers which are kept under pressure at all times by stacks which are set directly in the slip stream of the propellors. By the use of selector valves either or both of these chambers may be filled at will. Two very important functions are performed by this system. First the envelope is kept constantly under pressure at all times to preserve its shape and rigidity. Secondly, the airship may be trimmed for tail or nose heaviness by varying the volume of air in each chamber. A release valve is provided on each ballonet under the belly of the ship. The helium valve is located directly above the control car on the side of the envelope. All of the valves are operated by cable pulls mounted on an overhead panel.

Control of the ship is accomplished by means of a large vertical wheel mounted at the right side of the pilot's chair by means of which the elevators are actuated. Rudder control is effected in the conventional airplane manner by rudder pedals. In addition to the usual panel flight and engine instruments, manometer gauges are provided which indicate the pressure in the two ballonets and main envelope. As an aid to navigation on extended cross country trips, two way radio is provided for beam and weather reception.

THE average life of a blimp varies between two to six years depending on whether the ship is hangared or operated outside all of the time. Since the engines are operated at only fifty per cent of their rated output for cruising operation, the time between overhaul periods is quite high.

A crew of ten men accompany the blimp. Included in this number are the pilots, radio man, bus driver, airship rigger and the mechanics. A few men are hired locally at each stop to assist in maneuvering the airship on the ground. A portable mooring mast is part of the equipment and is set up at each stop for anchoring the blimp.

Despite the bulk of the airships, they maneuver with surprising agility and precision. For routine passenger hauling the ship is usually weighed off at zero weight or up to one hundred pounds heavy. Under these conditions the dynamic lift of the envelope furnished by the engine power will provide an ascent of as much as 2,000 fpm. On a take-off for a cross country trip the ship may be as much as 700 pounds heavy in order to provide for the reduction of load enroute by fuel consumption.

One of the most annoying difficulties experienced in operating in various parts of the country is the misguided individuals who take occasional pot shots at the envelope. Although this is not dangerous from the standpoint of gas loss it does mean frequent repairs for the crew. The first knowledge that the bag has been punctured comes about twenty-four hours after the hole has been made. The usual indication is that the airship is not able to carry its full pay load. Location of the hole is usually made by looking up into the bag through a window in the roof of the car. After a patch has been fitted additional helium is added. On the average about 1,000 cubic feet of gas is added each month.

To illustrate how fast the airships may be maneuvered it is interesting to note that a passenger carrying flight can be completed in as little as six minutes from takeoff to landing and with the motors turning up the ship is very responsive to the controls.

New Planes and Equipment

Variable wing area and interchangeability of power units feature this newest Seversky export model, now on a South American demonstration tour under command of its designer and builder, Major Alexander deSeversky.

SEVERSKY CONVOY FIGHTER

SEVERSKY'S most recent bid for fame in the military export market is contained in its new "Convoy Fighter," now on an aerial demonstration tour of all the principal South American countries. Permission has been granted by the War Department and federal government to market the fighter abroad.

The peculiar genius of Major Alexander deSeversky has produced a vertiable all-purpose military airplane in the new design. By varying the horsepower through interchanging engines and varying both the wing area and wing loading, the Convoy Fighter may be used as a fast light bomber, an observation plane, a pursuit plane, and attack plane, convoy fighter, or as a basic or advanced trainer.

Without any structural changes, motors ranging from 300 to 1200 horsepower can be easily and quickly installed. Variable, interchangeable wing panels, with a corresponding variety of gas capacity, permit a wide range of utility. The configuration of the wing is such that the outer panels may be changed in two respects: to increase or decrease the wing area and to incorporate a dihedral, whereby the wing area has a range from 220 to 250 square feet and dihedral of any desired angle.

Interchangeability of engines is accomplished by designing each different engine installation as individual units so arranged as to fit perfectly the four attachment points at the fire wall of the fuselage where the fuel and oil lines, wiring and controls have been arranged to fit any one of the possible engine installations. As a two-place fighter, the Wright "Cyclone" or Pratt & Whitney "Twin Wasp" may be employed. For expeditionary or observation work the 550 hp single row Wasp may be installed; and for training purposes, the 420 Wasp Junior or 300 Wright Whirlwind.

The all metal construction has been so designed that the stresses of flight are spread over the entire wing and no single beam carries a critical load. Hence the new model can take a lot of punishment from machine gun fire without being forced out of commission. Like predecessor Seversky models, the Convoy Fighter has integral riveted gasoline tanks, the fuel being carried directly in the wing and not in separate tanks. Gas capacity may be quickly and easily changed to any desired amount up to 600 gallons (3500 mile range) by the ample expedient of moving the bulkheads of the fuel container to a further outward position. Repairs of leaks are made externally without unriveting the covering or removing the tanks.

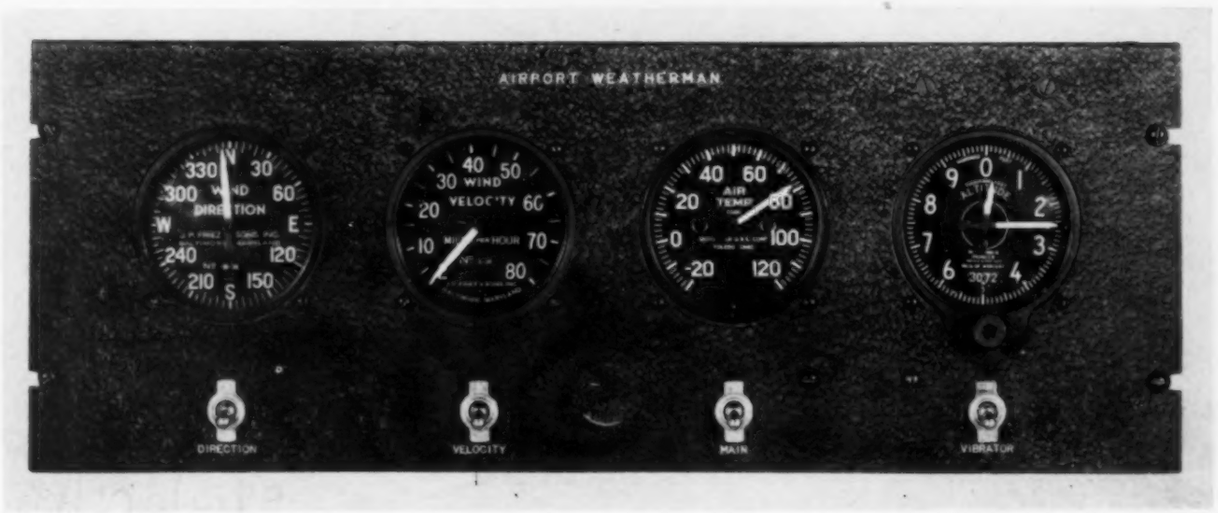
Armament includes a total of seven high-powered machine guns as well as two bomb racks capable of carrying three hundred pounds of aerial demolition bombs. The number of guns carried is of course optional. Four 50-calibre guns may be placed in the nose and are interchangeable with 30-calible guns. Provision is also made for a machine gun in each wing. The rear cockpit gun is mounted within the fairing back of the machine gunner's cockpit in a housing so designed that by means of releasing a catch, the entire housing revolves around the gun and disappears within the fuselage, leaving the machine gun in complete readiness for use and eliminating all awkward and difficult operation of putting the machine gun into firing position.

The original Convoy Fighter shown in the accompanying photograph and being personally demonstrated in Latin America by Major deSeversky is powered by the Wright Cyclone "G" Series engine of 1000 hp.

Specifications and Performance

Wing Span (36 feet with alternate wing panel)—41 feet.
Overall length—25 feet, 4½ inches.
Overall height—9 feet, 6 inches.
Wing Area—220 sq. ft. (with alternate wing panel—250 sq. ft.)
Wing Loading—200 gals., 27.1 #/ft. (with alternate wing panel, 24.1 #/ft.); 350 gals., 31.5 #/ft. (with alternate wing panel, 27.9 #/ft.)
Power Loading—200 gals., 8.5 #/H. P.; 350 gals., 9.9 #/H. P.
Weight empty—4034 lbs.
Useful Load—1918 lbs.
Gross weight—5952 with 200 gals. fuel.
Maximum speed (16,500 feet)—290 MPH.
Cruising speed (12,000 feet)—230 MPH.
Landing speed (with alternate panel)—65 MPH.
Rate of Climb—2150 feet per minute.
Service ceiling (with 200 gals.)—27000 feet.
Maximum range (12000 ft. with 350 gals.)—2020 miles.

Friez Airport Weatherman



Direct Weather Readings For Airports

This flexible assemblage may be a complete panel with wind, barometer and outdoor temperature, coordinately as shown above, or it may be simplified to any one element as a single indicator operating from its necessary transmitter. The major function is wind indication.

A COMPACT and efficient weather recording instrument, which has been called the "Airport Weatherman," is a timely development of Julien P. Friez & Sons, Inc., of Baltimore. The device gives wind velocity, wind direction, barometric pressure and outside air temperature, instantly at any hour of the day or night.

On the recording instrument panel are two dials for wind readings. One indicates wind direction throughout the whole circle of wind movement. The other shows wind velocity from 0 to 80 miles per hour.

The wind direction transmitter consists of a standard three foot metal wind vane which operates the shaft of a self-synchronous generator located in a metal, weatherproof housing directly beneath it. Generator movements, corresponding to the shift of the vane, are communicated electrically to a companion position motor which operates the pointer on the distant indoor indicator.

The wind velocity transmitter consists of a standard three-cup Anemometer which operates a self-synchronous generator electrically connected to a companion position motor in the indoor indicator. An ingenious magnetic-drag unit translates speed of rotating cups to linear readings on the distant dial directly in miles per hour.

Indicator for outdoor temperature is a distance reading thermometer, equipped with 10 foot capillary tube and a registering bulb, the system being properly compensated for the length of the capillary. It is necessary to protect the bulb from rain, snow and direct sunlight.

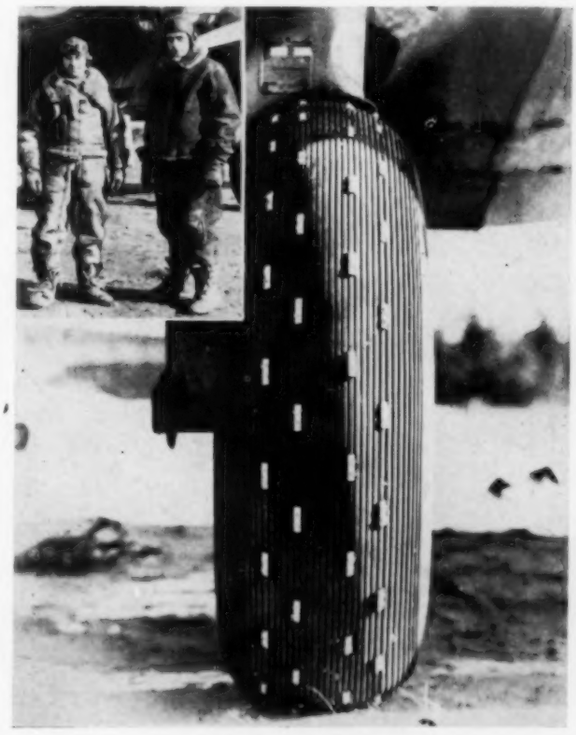
Barometric pressure is indicated by an aneroid barometer, thoroughly compensated for temperature changes. The wind transmitters and indicators operate on 32 volt, 60 cycle, single phase supply only. The almost universal 110 volt, 60 cycle single phase current can be transformed for the supply.

Two types of mounting are offered: flat panel for flush wall mounting as illustrated in the accompanying photograph, or alternate enclosed cabinet for desk or shelf installation.

Steel Cleats For Tires

IN the quest for safer stops when army planes have to land on sheet ice, the U. S. Army Air Corps has been carrying on an interesting experiment with steel cleats imbedded in the tread of the General streamline airplane tires. The cleats supplement the flexible, multi-vaned

(Continued on Page 26)



A General "Streamline" tire equipped with the new Army Air Corps steel cleats in an experiment to obtain more traction for landings and take-offs on sheet ice.

The Air Lines Ta

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The final step in Braniff's blind flying course is in one of the line's new fleet of Douglas airliners. On the left is Knighton "under the hood." While Shrader observes, Knighton flies the ship by instruments and radio, view of the ground entirely obstructed by the canvas hood.

It costs the airline $43.20 an hour to operate one of the big Douglases. Braniff pilots are required to put in three hours a month in blind flying practice. This time is usually split between a Stinson and the Douglas.

THE AIR LINES of this country are to be congratulated on the open and straightforward manner in which they are meeting the tough problem of increasing public confidence in winter air travel. Thorough, scientific preparation, frankness and conservatism are the effective tools they have employed. They have banded together to meet a common problem with cooperative action; and there is a complete realization of the fact that a mishap on any one line means a loss for all the operators, because the public still regards flying safety as a generality regardless of whose name is painted on the side of a transport.

Several policies have been adopted by all of the lines. The first of these is the decision to give complete and accurate weather information to all passengers requesting it. Every attempt will be made to show the ticket holder in a friendly manner the conditions all along the route to be travelled. In this manner many people will not get an erroneous impression of general conditions by some local overcast or squall.

A second and more important general policy is that of ultra conservatism in dispatching flights. Most of the lines have practically doubled their minimum limiting weather requirements before flagging a ship off and safe flying weather must be reported all along the route to the destination before a flight is approved. Minimum altitudes over mountainous country have been increased and in general the attitude is that schedules will be cancelled at any time there is any element of doubt concerning the advisability of the trip.

To further guard against any emergency, cruising ranges of all transports are being increased so that if weather is not fit for a landing at the destination, due to unforeseen sudden changes, the pilot will be able to continue on to the next stop or turn back to the point of departure. There will be no exceptions to this ruling and tickets will not be sold if the fuel supply must be reduced.

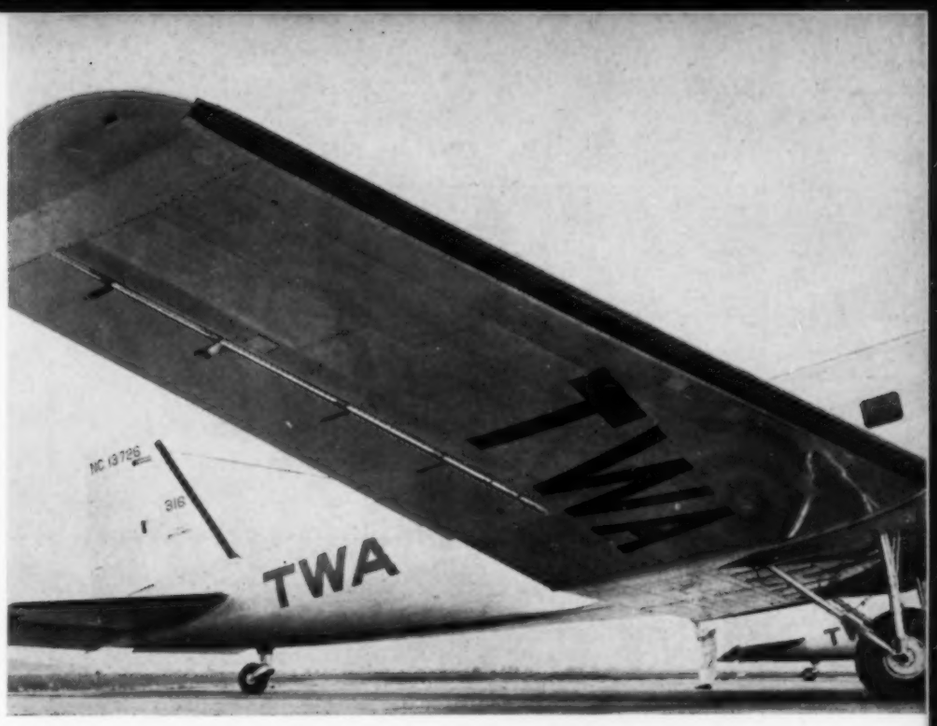
Steps have been taken also to make everything as convenient as possible for passengers who must be entrained due to the cancellation of a trip. Agents of the airlines will assist in making reservations and caring for other details.

MUCH energy and thought has been given to technical preparations. This includes de-icing equipment, improvements in radio, carburetor de-icing and many other developments of note. There has been an almost universal acceptance of the rubber shoe type of de-icer. This device consists of rubber coverings installed on the leading edges of the wings, fin and stabilizer. Air is forced in periodic pulsations through tubes that lie under the covering and the motion causes the ice covering to break off as soon as it forms. The pulsations, which are controlled by an elec-

The rubber "over-shoe" type of de-icer for wings and tail surfaces is standard equipment on all domestic air lines for winter operations. The rubber shoe is stretched over the leading edge and fastened to the wing on the upper and lower sides by a close row of Goodrich rivnuts.

Tackle Winter

of the air transport
against the sea-
towards building
winter operations.



After installation, the wing de-icer is a neat, close fitting unit. Air is forced in periodic pulsations of forty-seven second intervals. Pressure, which is obtained from the engine exhausts, averages about ten pounds per square inch.

trically driven master control valve, occur at forty-seven second intervals. Pressure, which is obtained from the engine exhausts, averages about ten pounds per square inch.

To overcome the formation of small holes in the covering, which is deterioration resulting from a build-up of static electricity, a prenite-graphite outer surface has been developed which is designed to bleed off electrostatic charges. An improvement has also been made by the addition of strong fabric reinforcements which are cemented to the inside surface of the outer covering at eight inch intervals. These serve the dual purpose of preventing "flutter" and eliminating any possibility of tears in the outer covering.

The slinger ring method of de-icing propellers is being used again this year with perfect success. This consists of an annular tube mounted on the hub which feeds the nozzles that spray each individual blade. The fluid, although used sparingly, breaks off and prevents ice coatings to accumulate. A further aid is the dural spinner mounted on the front of the hub. This is covered with a rubber coating which is impregnated with a castor oil solution. The ice will not adhere to this and the hub is protected from ice formation.

A new ice prevention development, which will be extensively used for the first time this winter, is an attachment devised by Douglas engineers for use on Douglas airliners. It consists merely of a special formed dural cover that will be riveted on the wing to close the gap where the Friez type aileron is attached to the wing. Although this will reduce somewhat the effectiveness of the lateral control it will stop the flow of air through the slot and prevent ice formation that might render the ailerons ineffective.

Prevention of carburetor icing is being accomplished in most cases by providing nozzles at the mouth of each carburetor venturi through which de-icing fluid is introduced. The fluid is not only very proficient at breaking up and preventing ice accumulation in the venturi throat but also increases the octane rating of the fuel and provides additional power.

OF SPECIFIC interest are the details of the operating program and preparations which are being made by individual lines to meet special problems. United Air Lines, for instance, have set new minimum altitudes above terrain at 2,000 feet. Over some parts of the route this will mean an altitude of 11,000 feet above sea level, and, purely as a precautionary measure, oxygen equipment has been installed.

More "slack" in schedules is also being provided by adding one hour to the west bound and thirty-five minutes to the east bound coast to coast flights. By this means it is planned to use only 50 per cent of available power for cruising flight which will increase the cruising range and eliminate all need of haste to maintain schedules. It

Vital to the comfort of passengers on American Airlines during the winter months are the steam heating units with which each Flagship is equipped. The mechanic above is working on one of the boilers, developed for the planes by American Airlines' engineers and manufactured in the company's shops for several other air lines.

The propeller hub assembly, showing the oil slinger ring and spinner. The ring has an outlet in the form of a tube which may be seen leading to the front of the propeller blade. The spinner is painted with castor oil before flight, while the ring supplies a constant flow of glycerine solution to the blades by centrifugal force.

will be possible to maintain the same altitude when flying through headwinds or bad weather as under favorable conditions.

Sufficient cruising range will be provided on all flights to permit flying to an alternate scheduled airport if weather conditions at the destination will not permit a safe approach. For example, a plane flying from Chicago and Newark will have enough fuel to return to Chicago or to Cleveland if a landing is inadvisable at the scheduled destination. Enough fuel is carried on the flight from Los Angeles to San Francisco for a round trip.

Of outstanding importance is United's recently announced policy of guaranteeing captains and first officers a monthly pay check approximating their previous average monthly income, regardless of hours flown. Thus captains are paid for their judgment not to start a trip and to terminate a flight as well as to start and complete trips. It is an admirable step forward towards safe and conservative operations.

Among special technical developments employed by United is the shielded loop antenna with static resisting "blisters" acting as guards. Experiments are also being completed for a series of trailing wires designed to further eliminate static. Accelerometers assist the pilot in operating in smooth air while a recording flight analyzer provides a check on the flight for operations officials.

TWA is anticipating the winter flying season with new round trip winter excursion rates that mean a saving to the passenger of twenty-five per cent. In many cases the fare cost is below that for rail plus Pullman transportation. Undoubtedly this will be a strong inducement to many people who are definitely sold on air travel but cannot quite justify the cost.

As an adjunct to a season of conservative winter schedules, TWA is making plans to further every comfort and convenience for passengers who must be entrained or delayed due to cancelled schedules. Under the new set up the line takes full responsibility for the passenger to his destination regardless of how the trip must be completed. If passengers are entrained, for instance, all reservations will be made by line officials and a hostess will accompany the travellers to the destination and provide them with all service possible.

BRANIFF, American, and Delta Airlines will all benefit from a new but temporary radio range station that will be set up south of Love Field at Dallas. Under the agreement, air lines and operators are furnishing the buildings, poles and other miscellaneous materials while the Bureau of Air Commerce is supplying the technical equipment and personnel. When new appropriations are available a permanent station will be set up for the service of this heavily trafficked airport. The temporary station will be an important aid in furthering winter flying.

Pennsylvania-Central Airlines have developed a new and expanded meteorological department, a new centralized flight control unit with twenty-four hour coverage. Bendix directive radio loops and anti-static antenna systems have been installed on all the ships to provide an accurate check on position. Each flight will be released by the central flight control unit regardless of weather conditions following a conference between pilots, weather personnel and flight control officers.

Most concrete evidence of the faith that insurance agencies have in the safety of airline travel is the newly announced rate of $1.80 per $1,000 for air travel insurance up to a maximum of $25,000. The policy covers all indemnities provided by other forms of travel insurance and the holder may travel as often as he desires throughout the year. Such an announcement precludes any conjecture about the safety of flying on scheduled airlines since the insurance companies are not among those who do business on guess work or supposition.

Mulligan Appointed Assistant Director

The appointment of Denis Mulligan, formerly chief of the regulation and enforcement division, as an assistant director of the Bureau of Air Commerce, was announced October 27 by Secretary Roper.

The organization of the bureau will be in no way effected by the appointment and Roper made the following statement:

"Mr. Mulligan will share with Director Fred D. Fagg, Jr., and Assistant Director Howard Rough the multitude of details connected with the administration of the work of the Bureau of Air Commerce which has been greatly increased due to enlargement of the inspection and airways program.

"The seven divisions into which the Bureau was reorganized early this year will remain as they are. It is planned that Mr. Rough will devote most of his attention to supervisory work connected with the bureau's field program while Mr. Mulligan will be concerned largely with affairs in the Washington office and matters of a legal nature relative to the bureau's activities."

News of the Month in Review

Manufacturers Sales Mount

Stearman Receives New Award

A new contract amounting to $122,229 was recently awarded to the Stearman Aircraft Company for an additional twenty airplanes of the PT-13A type. Completion of this group of airplanes is scheduled before the end of April, 1938.

The last airplane of the contract for the Brazilian government was recently completed and shipped. These airplanes are equipped with one flexible and one fixed machine gun as well as radio and are powered with a Wright R975-E3 Whirlwind engine and are designated model 76-C3.

In addition to the Army contract the Stearman firm is busy with sub contracts from the Boeing Aircraft Company and Douglas Aircraft Company and experimental development.

North American Orders Increased

According to an announcement by Assistant Secretary of War, Louis Johnson, North American Aviation, Inc., is the recipient of a new contract for a total of 55 observation planes to cost $1,731,407. Seven of these ships have been allocated to the regular army and 48 for the national guard.

This contract supplements one which was awarded in February for 109 observation planes at a cost of $3,429,600.

Boeing Expands to Meet Contracts

Boeing Aircraft Company recently completed a factory expansion program which included an addition to its new plant number two adjacent to Boeing Field, which more than doubles the size of the original building that was constructed on the site last year. The new plant embraces a floor area of 135,000 square feet plus 21,000 square feet of balcony space, which will be used for sub-assembly work and final assembly of all four engined landplanes including transports and bombers. The company's main plant will be devoted to primary work on parts of all planes and complete assembly of four-engined flying boats.

Piloted by Edmund T. Allen, consulting engineer and test pilot, with Major John D. Corkville, air corps representative as co-pilot, the new XB-15 Boeing bomber was test flown for the first time on October 15. The huge airplane slipped into the air easily and the test flight was very satisfactory.

The new bomber has a gross weight of more than thirty tons. It is approximately 90 feet long, eighteen feet in height and has a wing spread of 150 feet. The landing gear on the new ship has been altered to mount a total of four wheels instead of two as on the B-17 model. Defensive armament consists of six enclosed machine gun emplacements —a nose turret, a top turret, and four streamlined "blisters," one on each and two on the bottom of the fuselage.

A total of thirteen of the B-17 model bombers with spare parts for two airplanes have been delivered. A recently awarded contract for thirteen XB-15 bombers with spare parts for two ships brings the total number of the latter model on order to an equivalent of thirty airplanes.

Six New Stinsons to Bureau

The Bureau of Air Commerce has placed an order for six Stinson Reliant airplanes for use in the army engineering division of the bureau. The airplanes are to be placed in service shortly and will be equipped with devices for checking the operation of the radio beam facilities and other radio navigational aids operated by the bureau.

California Buys Taylor-Young

Jones & Huneston, southwestern California distributors for Taylor-Young airplanes, have been setting some sales records in that section. There sales in September amounted to nine but by October 15 seven more planes had been delivered. One of the latest promotion features is the display of one of the airplanes in a Hollywood parking lot, less than a block from world famous Hollywood and Vine. One ship was recently sold to Lief Erickson, film player, and two airplanes to Huchendorf Flying Service of Clover Field.

Doolittle Buys Seversky Sinclair to B. A.

Major James Doolittle took delivery on November 4 of a Seversky "Executive" model airplane for use in a series of extensive sub-stratosphere flights which will be made at altitudes between 25,000 and 30,000 feet. Studies will be made of fuel consumption and physical reaction under high altitude conditions.

The Seversky airplane will be a duplicate of the one flown by Frank Fuller except that it is equipped as a laboratory with complete instruments and a Sperry Gyro Pilot. The high speed of the ship at the proposed altitude is estimated to be 350 mph. The tests are being conducted by the Aviation Department of the Shell Petroleum Company of which Doolittle is the head.

Two days after Doolittle flew away with his new ship, Frank Fuller, Jr., lifted his record breaking Seversky from the airport at Vancouver, Canada, and pointed his nose toward Aguacaliente, Mexico. Spanning the distance in the new low time of 4 hrs. 54 min., he shattered the previous mark of 5 hrs. 28 min. formerly held by Earl Ortman. Fuller made an average speed of over 260 mph despite stiff headwinds.

Lieutenant Frank Sinclair provided the natives of Buenos Aires with a special demonstration of the Seversky Convoy Fighter when it was unloaded at the steamship dock there. When it was found that the streets of the city were too narrow for the airplane to be transported that way Sinclair elected to fly the plane direct from the 200 ft. pier to the airport. Obtaining permission of military and civilian authorities he gunned the plane off with perfect success.

27 Cubs to Denmark

The largest single foreign shipment ever received by the Taylor Aircraft Company has been signed with the Cub Aircraft Ltd. of Copenhagen, Denmark. Details of the order are being handled by Jack Hedegard, general manager of the Danish concern, who arrived on the steamship Normandie.

A total of 25 airplanes are to be shipped immediately in knock-down form with fifteen dual and ten single ignition Continental engines. With the airplanes will go jigs and dies and the balance of the manufacturing and assembly will be done abroad. The Danish company has purchased the former Rohrbach aircraft factory for manufacturing purposes.

An order for two completely assembled airplanes will be filled along with the knock-down planes. The large order came closely after the shipment to Denmark on October 27 of two Cubs.

Aeronca Makes Early Bid

Making an early bid for business in 1938 the Aeronautical Corporation of America has made two radical changes this Fall. One is the development and announcement of the new model for next year in the Fall rather than in the Spring. Of further interest is the reduction in price of the new Aeronca "K" model from $1,745 to $1,480.

According to W. J. Friedlander, president of the company, the new

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company policy has leveled the seasonal slump common to airplane manufacture to a minimum and eliminated much of the seasonal layoff. The General Aircraft Dealers of Toronto, Canada, were recently appointed as Aeronca distributors for Canada.

Fairchild Sales Up 30 Per Cent

Sales for the first ten months of 1937 marked a thirty per cent increase over business for the same period last year, according to F. A. Galligan, vice-president and general manager of the Fairchild Aircraft Corporation. Sales for this year also exceed the best total for any previous year by twenty per cent. More than ninety per cent of sales were of the Fairchild model "24."

Among recent buyers of the Warner "24" model are Air Activities, Inc., of Houston; Dick Hair of San Antonio, whose ship is equipped for aerial photography and mapping; Henry S. Morgan (his second ship this year), Roy Snyder of Bloomsberg, Pa., Henry Stevens of New York, Miss Barbara Towne of California and the state highway department of Florida. The latter ship will be fitted for photo and mapping work.

Antoine Gazada, director of the Oerlikon Machine Tool Works of Zurich, Switzerland, recently placed an order for a Ranger powered model "24." The company is purchasing the airplane for the use of Mr. Gazada in making flights to various European capitals that he visits at regular monthly intervals. Cruising altitudes of 15,000 feet are necessary in flying over the Alps of Switzerland and Italy.

Cessna Supplies Foreign Markets

A gain in export sales by the Cessna Aircraft Company this year is reported by Dwane Wallace, president of the company. A total of ten C-37 models have been shipped to seven foreign countries during the first nine months of this year. This exceeds a total of nine for the entire twelve months of 1936.

Turner Represents Stearman Hammond

Colonel Roscoe Turner recently joined the Stearman Hammond Aircraft Corporation as sales representative for the middle west. Turner will make his headquarters at Chicago and will take delivery on his demonstrator model "Y" very shortly.

Wm. Joy, prominent Detroit business man, has been granted a sales distributorship for the state of Michigan. He has taken delivery on his first airplane and plans to fly back to Detroit.

Grumman Completes Twelve Amphibians

The entire first production run of twelve G-21 amphibian airplanes have been sold by the Grumman Aircraft Engineering Corp. and five of these delivered. Orders for the dozen airplanes have been placed by Wilton Lloyd-Smith and Marshall Field, H. S. Morgan, E. Roland Harriman, G. W. Deeds, vice-president of United Aircraft Corp., Powel Crosley, Colonel Robert R. McCormick of the Chicago Tribune, Captain Boris Sergievsky of Sikorsky, McIntyre Porcupine Mines, Ltd. of Canada, John S. Phipps, Gar Wood and two airplanes for the Asiastic Petroleum Corporation for operation in the Dutch East Indies and Australia.

The first two airplanes delivered have been in continuous daily service in and out of East River in New York City. This has been an excellent proving ground for the amphibians. The Asiatic Petroleum Corporation's two airplanes will be supplied with a special electrical system and a large camera hatch capable of mounting and domestic or foreign mapping camera. It features a swinging mount with a large plug in the bottom aft of the main step.

Lockheed "14" Granted ATC

After successfully passing an exhaustive series of flight tests the Bureau of Air Commerce granted an Approved Type Certificate on the Lockheed model "14." Deliveries of the "14" to the Northwest Airlines are being made and the airline has been doing considerable flight testing of the new ship over their routes.

Fowler wing flaps are a feature of the new airplane and are used both for take-off as well as landing. With the aid of the flaps the take-off run at sea level requires only 650 feet and is accomplished in 13 seconds. Landing speed with flaps is 65 mph. The maximum rate of sea level climb is 1,490 fpm. Maximum speed at 7,000 feet is 246 mph and cruising speed at 12,000 feet is 227 mph. Powered with two Pratt & Whitney geared Hornet engines of 850 hp each the range is 1,950 miles.

Boeing Builds Flying Yacht

What will likely be the largest and most luxuriously fitted private airplane in the world has been ordered by Captain George Whittell from the Boeing Aircraft Company of Seattle. Of the same design as the model 307 now under construction for TWA, the airplane will be fitted with four engines and extensive interior furnishings.

Captain Whittell is a wealthy sportsman resident of Woodside, Califonia.

The interior of the cabin will be divided into commodious suites to carry thirteen persons in roomy luxury with sleeping accommodations for seven. A crew of three will be provided for. There will be a dining room and lounge, bedrooms for four guests, and a master suite with all the conveniences of home including hot and cold running water, radio and private shower. A refrigerator will be fitted in the galley.

Captain Whittell owns a luxurious twin engine plane at the present time and plans to use the new Boeing for world cruises. With a cruising range of 3,300 miles it will be possible to make a non-stop flight to Europe with a great margin of reserve. The cost of the mammoth airplane will be slightly under $300,000 and completion of the craft is expected late next year.

P & W Grants Australian License

Commonwealth Aircraft Corporation Proprietory, Limited of Melbourne, is the most recent licensee of the Pratt & Whitney Aircraft Company. The new corporation is backed by some of the largest firms in Australia and is capitalized for 1,000,000 pounds. Selection of the Pratt & Whitney engine was made after an Australian commission made an extensive tour of various European countries and the United States.

The series "H" Wasp engine will be put into production first and Pieter W. Schipper, former project engineer for Pratt Whitney, has sailed for Melbourne, where he will take over the position as chief engineer. He will be assisted by an executive and supervisory staff consisting of experts of Australian and British nationality.

According to reports, the new plant at Melbourne will be one of the most modern and completely equipped airplane and engine factories in the world. A license has also been granted to build the North American NA-16 military airplane.

Bureau Reports on Air Safety

Miscellaneous aircraft operators flew 625,833 miles per fatal accident and 1,024,090 miles per passenger fatality in the six months of 1937, according to the Bureau of Air Commerce.

Operators in this category, which includes flying services, schools, photographic flying, crop dusting and private flying, suffered 842 accidents during the period of 45,059,950 miles of flying. Miles flown per accident were 53,515.

Causes for accidents in miscellaneous flying were divided as follows: Personnel errors, 51.33 per cent; power plant failures, 13.78 per cent; airplane failures, 9.82 per cent; weather, 8.03 per cent; darkness, 0.08 per cent; airport, water or terrain, 12.68 per cent; other causes, 4.04 per cent, and doubtful, 0.24 per cent.

Total miles flown for the six months of this year were 45,059,950 as compared with 41,517,085 for the same period in 1936. Miles flown per passenger fatality increased only slightly from 1,012,612 in 1936 to 1,124,090 this year.

Peace Reigns Over Northrop

After an enforced idleness of six weeks while labor officials and Douglas executives grappled in a seemingly hopeless deadlock, the Northrop division of Douglas swung into productive activity on October 23 almost as suddenly as it ceased with the strike on September 2nd. Practically all of the 1,400 employees originally identified with Nothrop are back at their jobs after filing new applications and signing a special contract drawn up by Douglas officials.

The contract, which each former employee was required to sign before a notary along with his application, reads as follows:

CONDITIONS OF EMPLOYMENT

(1) "I agree that I will not go on strike, or seize Company property or occupy Company property without authority of the Company, and will perform my duties in an efficient manner and not indulge, singly or jointly, with others in "slow-down" or "pace-making" and will not interfere with any other employees of the Company in the performance of their work, and that if I do, the commission of any of these acts will be an agreed cause of discharge.

(2) I will not molest in any manner, or use intimidation or coercion upon any employees of the Company in order to force them to join or refrain from joining or becoming members of any union, association or organization.

(3) I will neither advocate nor participate in any coercion or any threats of bodily harm or damage to any employee, the property of any employee, or the Company, or in any violence or unlawful act to enforce the settlement of any difference that may arise between this Company and me, or my fellow workmen.

(4) I agree not to commit sabotage on the property of the Company, its equipment, airplanes and airplane parts, and will report to the Company any act of sabotage or any known threat of sabotage.

I agree that in the event that I shall commit any of the acts enumerated in paragraphs (1), (2), (3) and (4) that the commission of said acts will be good and sufficient cause for discharge, and I further agree that in the event any of the said acts are committed by me, to

forfeit the sum of Fifteen Dollars ($15.00) which is to be deducted from my wage check at the termination of my employment, and I hereby authorize the Company to make such deduction from the wage check in the event of my discharge as the result of the breach of any of the said conditions of employment. It is understood that the $15.00 so forfeited by me will be placed in the employees' welfare fund to be distributed under the rules of said welfare fund for the benefit of the Northrop division of Douglas Aircraft Corporation.

It is further understood that the Company is not limited to the above reasons to terminate my employment and that I agree to abide by the regulations set forth in the Company's Rule Book as it may be changed from time to time and that willful infraction of any of the

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Seasoned fliers and beginners alike marvel at the superb performance of the easiest to fly, easiest to buy of all airplanes. Climbing close to 400 feet per minute with a take-off of less than 200 feet, even when fully loaded, the Cub gets in and out of the smallest field with ease and safety.

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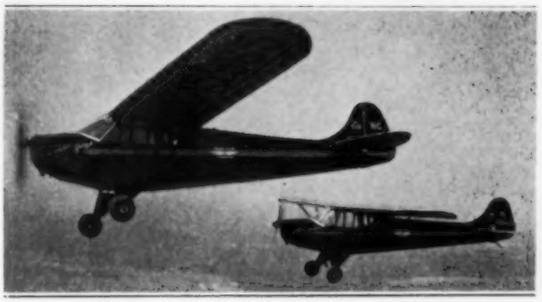

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In and near Dallas—INVESTIGATE our "Cub" Club plan which provides MORE instruction and flying time for LESS money, and places flying within the reach of all. We have students from all over North Texas enjoying the best flight training possible at the most economical rates available today!

Let us explain the Club plan to YOU!

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Cub Distributor For North Texas

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SUPREME LIGHT PLANE OF THE TEXAS PLAINS!

Let us demonstrate the "Cub" to you.

WM. C. BREEDLOVE

Cub Sales - Student Instruction - Charter

Municipal Airport Lubbock, Texas

Company's rules is just cause for discharge or other disciplinary action as the Company may deem fitting, but it is expressly understood that I agree to forfeit $15.00 only in the event I violate any of the conditions set forth in paragraphs (1), (2), (3), and (4) above.

It is understood and agreed that the terms of this agreement are to correspond with all of the laws and statutes of the State of California and the United States of America.

I hereby voluntarily accept these and all other conditions of employment and agree to sincerely abide by them."

The Northrop situation has been rumbling for many months with accusations from both sides of sabotage, slow down strikes together with charges that union employees were discriminated against and the workers were not being fairly represented. Very recently Major K. B. Wolfe spoke for the U. S. Army Air Corps to the effect that no more airplanes would be accepted from the Northrop plant until complete assurance could be given that there was absolutely no sabotage or inferior workmanship entering into the construction of military airplanes for the army.

On March 15, 1937, the Northrop management voluntarily entered into an agreement with Local No. 229, United Automobile Workers of America, a C. I. O. affiliate, and signed a contract wth that organization. A formal election, as provided by the National Labor Relations Act, followed on August 19. The Labor Board officials certified 897 of the employees as eligible to vote, excluding clerical and non-skilled workers. Out of 696 employees who actually took part in the vote, 480 of them named Local No. 229 as their collective bargaining agency.

Shortly after the vote was taken another meeting was called at which time the strike was called, the charges being that employees were being laid off for union activities and that Northrop officials were not abiding by their agreement with the employees. The strike was apparently called by a minority vote of the workers as evidenced by the favorable attitude of the workers toward re-opening the plant.

Miami Program Announced

EXPECTATIONS are that nearly 600 airplanes will be on the field at Miami to participate in four days of aerial speed and spectacle which has been arranged by the Greater Miami Airport Association in its program for the Tenth Annual Miami All-America Air Maneuvers on December 2 to 5.

Twelve competitive races and flying contests headline the program, which also includes demonstrations of human glider towing, bat-wing, delayed and robot parachute jumping, inverted acrobatic flying, acrobatic contests, military "dog fights" and catapulting planes from speeding automobiles.

The four day program, which will be staged at Miami Municipal Airport, opens on Thursday, December 2, with the arrival of sportsman pilot cruises, military squadrons and individual contestants.

The schedule of competitive events for the three following days is as follows:

Friday—1. Race for passenger planes of 850-cubic inch piston displacement or less, open or closed models, 30 miles, six laps over 5-mile course, $1,000 purse.

2. Free for all for planes of 550-cubic inch displacement or less, 30 miles, 6 laps, $1,000 purse.

3. Race for passenger-carrying planes, open or closed, of 200-cubic inch displacement or less, 10 miles, 4 laps over 2½-mile course (qualifying heats), trophy to winner.

4. Novelty race, 10 miles over short course, trophy to winner.

Saturday—1. Race for passenger planes, 200-cubic inch displacement or less, 10 miles over short course (qualifying heats), trophy to winner.

2. Free for all race for planes of 397-cubic inch displacement or less, 50 miles, 10 laps over 5-mile course, $1,250 purse.

3. Slow race, last to finish wins trophy.

Sunday—1. Glenn H. Curtiss trophy race, free for all planes of any class, 50 miles over big course, $1,500 purse.

2. Finals, passenger plane race of 200-cubic inch displacement or less, 10 miles over small course, $600 course.

3. Free for all for sportsman pilots, 30 miles, 6 laps, trophy to winner.

4. Acrobatic contest (by invitation) for Freddie Lund trophy.

5. Novelty race, 10 miles over small course, trophy to winner.

The novelty race will be an innovation for the amusement of spectators. Contestants must gulp down a sandwich, race on foot to their planes on a starting line, taxi off, hop a hurdle and circle the race course, then land and repeat this procedure on another lap before the winner is decided.

Also interspersed through the program, which will be changed each day, will be demonstrations of airplanes towing human gliders and robot parachute jumping contests in which parachute jumpers will compete with mechanical robots in delayed parachute drops.

Major Al Williams will demonstrate dive bombing on miniature targets, broadcasting by short wave from his cockpit as he makes these power dives.

Lt. Joseph Mackey, holder of the Freddie Lund trophy, which ranks as an aerobatic prize with the Thompson and Greve speed trophies, will defend his title.

Following the meet, there will be a cruise of its participants to Havana, where they will be guests for three days of the Cuban government, during which they will stage a one-day air meet.

Los Angeles Seeks an Airport

Biggest news that Angelenos will hear in the next few months will be the disposition of the present air mail field question. The City of Los Angeles has voted to buy Mines Field (Los Angeles Municipal Airport) and, with WPA money, hopes to build it up to compete with grand Central and Union Air Terminal. Competition in this case means only one thing, the removal of all airlines to the south part of town.

Despite the fight being put up by civic bodies in Glendale, Burbank and Pasadena, opinion seems to be that the lines will eventually move to the Inglewood field. Observers suggest that the city would not have voted to buy this property at a price six times its assessed value if there had not been some assurance of airline cooperation. All the lines would have to move in a body as the post office would not allow a 30 mile separation between air mail fields.

Most anxious to avoid the change is Union Air Terminal. Unlike Grand Central, it is considered a strictly airline field despite the fact that three or four sizeable operators use it to advantage. Restricted to ships of over a hundred horse-power, it has consistently frowned on politics that tends to build up "fiive and ten" patronage.

Grand Central stands to lose little by the change. In spite of the fact that two airlines, American and Pan-American, would leave, the field is so well established as a non-airline base that their loss would hardly be noticed. On Grand Central is the largest aircraft technical school in the country, Curtiss Wright Tech. There is also the Grand Central Flying School, one of the leading schools on the coast, a large engine repair shop drawing from non-airline sources, an instrument shop, a propellor shop, repair base and several airplane distributors.

Mines Field operators are not particularly concerned over the outcome of the fight. Unlike many fields, where fixed-base operation is jeopardized by the arrival of an airline, the airport would be divided with the lines using one-half and private flying the other.

The airlines are somewhat perturbed over the whole fight. Unlike Union and Grand Central fields which have not made public announcements regarding the condition of their competitor, Los Angeles repeatedly points out natural hazards surrounding the two northern fields. These fields, being patronized by airlines, hesitate to refer to climatic conditions to the south, which are bad, on the grounds that newspaper readers will gather that no Los Angeles airport is safe and will avoid flying. Despite of this reticence on the part of the incumbent air mail fields, Los Angeles accusations continue, worrying the lines considerably.

Probably disposition of the case will see all the lines either on Union Air Terminal or on Mines, with Grand Central, closest to town, continuing as the top private flying field. Union, which stands to lose most, has plans drawn up for complete revision of runways up to 7,000 feet in length.

Traffic Continues Growth

TWA Announces Excursion Fares

Transcontinental & Western Air showed a 17 per cent increase in passengers during October of this year over the same month in 1936, according to Jack Frye, president. Travel on the line is up seven per cent for the first ten months of 1937 as compared with last year.

Making a strong bid for winter patronage the line announced that effective November 8, special round trip excursion rates would be in effect which would reduce the cost of previous fares by twenty-five per cent. In many cases this lowers the costs of tickets to less than that charged for rail plus pullman. A sample fare is that between New York and Chicago. With the new rates the fare is $67.42, by by rail plus pullman the cost is $66.50 and by non excursion air rate $80.90.

During the coming year, officials announced, six new Boeing 33 passenger four motored airliners will be placed in service. Four more Douglas 21 passenger Skyclub liners and two additional 16 passenger Skysleepers will also be added to the fleet. During 1937 TWA has expended $3,478,500 for new equipment and refinements to present equipment. That, plus the new expenditures, brings the total funds spent by TWA in its huge equipment program for 1937 and the spring of 1938 to $4,891,500.

American Makes Gains

By transporting a total of 17,337 passengers over its nation wide system during the first 15 days of October, American Airlines registered a gain of 2.7 per cent over the comparable period in September, the previous record month.

The largest increase was reported on the Chicago-St. Louis-Oklahoma City-Dallas route which showed a gain of 21.7 per cent. American transported 31.7 per cent of all air line passengers carried in the United States during the first six months of this year.

Ports of Call

Correspondence from the Airports and Airways

Birmingham, Alabama

By Earle Wheeler

Throughout the past summer Birmingham's Dawn Patrol made weekly flights to nearby airports and the results were gratifying. Local interest in aviation was stimulated and the new airports and improvements by WPA were safeguarded against deterioration and loss. The City of Birmingham built up good will and stimulated a cooperative spirit among other cities in advancing state wide aviation.

Local operators, including Glenn Messer, Harry King and Odell Garrison, provided their students with some excellent cross country training and gained some new students from neighboring towns. Private pilots who took part had an interesting diversion from merely circling around the airport.

From six to twelve planes left on each one of these flights and a licensed pilot accompanied each student. Not a single accident of any kind marred the season. In practically every city visited the local chamber of commerce or flying club met the fliers and provided them with breakfast. Following this there was usually a discussion on aviation problems.

The new home of the 106th Observation Squadron will be dedicated Saturday afternoon, October 30. Attending the dedication will be the group of Washington aviation officials now on an aerial inspection tour of the nation. Major Hentry Badham, C. O. of the squadron, has appointed a committee consisting of Capt. Hester Smith, Capt. Ronald Hicks and Lieut. E. L. Sykes to arrange the program. The Birmingham Aero Club, which is assisting, has appointed a committee consisting of Steadham Acker, chairman; Harold Wood and Howard G. Clark, Jr., and Asa Rountree, state aviation director, is representing the aviation commission on the arrangements committee.

W. McKay Wright, world traveler and lecturer, spoke at the Birmingham Aero Club meeting October 28 at the municipal airport. His subject was "Conditions in China Today." Frequent visits to China by this famous globe trotter have given him a thorough knowledge of the ambitions, weakness and present conditions of this country.

Several interesting developments on the proposed air line through Birmingham were reported to club members by Steadham Acker, airport manager. Musical numbers by some of the local entertainers made up part of the program. All student pilots and fliers were invited to attend.

George A. Wiggs, Bureau of Air Commerce inspector, spent October 26 and 27 in Birmingham. A number of pilot and plane licenses were renewed and Winfred Grissom successfully passed his test for a transport.

Cincinnati, Ohio

By Al F. Davis

There will come a day when some enterprising insurance company will issue a policy against falling parachute jumpers. Mr. and Mrs. Albert Rape of this city could have used such a policy on the afternoon of October 3rd when Buddy Batzel, well known parachute jumper, drifted down on the lawn of their home which is located near the airport.

The couple had just been married and were entertaining the bridal party on the lawn when Buddy floated down in their midst with parachute and all. Buddy is well up on his wedding etiquette and rushed over and kissed the bride forthwith. Then he took the pair over to Watson Field, where they were given a ride in one of the transport planes.

SOLD! *and the Proud Owner Flys 'er Home*

SOLD! Yes, but we have more "Cubs" in stock. Hangar Six, Inc., keeps one of the most complete stock of "Cubs" in the nation. Our recent sales reflect the "Cub's" popularity in Southwest Texas. Drop us a card or letter and we'll arrange a visit!

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STINSON FIELD **SAN ANTONIO, TEXAS**

Weather which ranged from inclement to lousey caused the Queen City Sportsman Pilots Race to be postponed to October 10th. However, this show was a huge success as there were a large number of entries. Just about every type of commercial plane manufactured participated in the event. There were several Aeronca high and low-wing planes and several Wacos including the Standard Oil ship which is a rather classy job. Included among the entries were Stinsons, Porterfields, Luscombes, Fairchilds as well as many other makes. There were several rather nifty exhibitions of flying as the racers climbed steeply in the take-off from Lunken Airport and banked over the first pylon. Trophies were awarded to the winners of each division by the Queen City Flying Service, the Aeronautical Corporation of America and the Standard Oil Company.

Dave Reif, Aeronca test engineer, has just returned from the west coast in time to enter the Ohio Valley Motor Boat Racing Meet, and set a new world record for the 25 Division II class of speed boats. The boat was designed by Reif and is one of the cleanest speed boats ever seen on the Ohio. Power plant is the Ford V-8 engine converted for marine use.

S. J. Wittman, famous racing pilot, was a visitor at the Aeronca factory recently.

Coffeyville, Kansas

By Harold E. Haggard

Henry Duncan has traded his six month old model K Aeronca for a brand new 1938 model. "Hank" has put in several hundred hours on the old ship and soloed fourteen students, one of them being his wife. Increasingly good student business prompted the purchase of the new plane. Most recent students to sign up are Delmar Cassida, Dan Collins, Howard Scholey and Floyd Gerdes.

Ray Jensen has passed his test for a private license. Ray has been making several trips lately in the Jensen Brothers Mfg. Co. Waco which included one to New York and another to Houston.

The Inman Brothers Flying Circus is barnstorming in western and central Kansas with their Ford and Boeing 80-A.

Charles Spencer, pilot for the Me-Tex Supply Company of Hobbs, N. M., stopped here recently in the Me-Tex Beechcraft. He was accompanied by T. B. Sudderth, manager of the company, and Sudderth's daughter, Mrs. Billy Collum, who visited relatives in Nowata, Oklahoma.

Ray Sage, Coffeyville's youngest pilot, recently soloed the Coffeyville Airways American Eagle, "Betsy." His first triumph was soloing the Duncan Aeronca. Al LaFavre, Aeronca salesman from Cincinnati, has been quite a frequent visitor around here. Lee Madewell has sold his OX Curtiss Robin to Ernie Blagg.

Enid, Oklahoma

By Wally Abbott

To Tommy Green goes the doubtful honor of being the first member of the Enid Flying Club to make a forced landing. The carburetor iced up and the motor just died. He very calmly selected a nice comfortable cow pasture and set the ship down like a veteran. It was a nice bit of flying but the club members hope it doesn't happen again.

Dewey Mauk of Blackwell came into the field recently and gave several demonstration hops in his new Taylorcraft for which he is a distributor. He is planning to establish a dealer here. It shouldn't be hard since everyone who flew in the plane is still talking about it.

Le Roy Campbell recently soloed Harold Kindreds' Porterfield. Le Roy will be leaving soon for California to take a course in aeronautical engineering. Jack Taylor has been spending quite a bit of time in the Porterfield in order to renew his private license which he let lapse some time ago.

Joe Durham had the misfortune to ground loop his automobile with the result that he has one leg in a cast. This is a tough break as Joe was about ready to take his private tests.

Harold Kindred had one very busy day recently while flying Bud Gentry's Stinson. He picked up Gentry at Oklahoma City and flew to Ponca City and then continued on to Blackwell. From Blackwell he brought his passenger back to his home and flew on into Enid. Gentry is head of the state highway patrol and was making a business trip.

Visitors to the field this month included R. C. Reeves in a Spartan Executive, J. A. Erickson in a Taylor Cub, Roy French in an Eaglerock, L. L. Rupert in a Travel-Air, a Mr. Jones in a Beechcraft and a B-12 Bomber belonging to the Army.

L. L. [Lib] Rupert

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Muskogee Municipal Airport

Muskogee, Oklahoma

Fort Worth, Texas

By Margaret Ewing

A large delegation of Fort Worth citizens, including the chamber of commerce aviation committee, WPA officials, and a special committee appointed by Gov. James V. Allred, were at the municipal airport October 26 to welcome high ranking officials of the Bureau of Air Commerce and WPA.

In charge of the party was Corrington Gill, assistant to WPA Administrator Harry Hopkins. Others in the party were: Howard Rough, assistant director, Bureau of Air Commerce; Sumpter Smith, WPA's chief aeronautical engineer; Dr. George Lewis, research director for the N. A. C. A.; A. B. McMullen, airport section chief, Bureau of Air Commerce; Lester D. Gardner, secretary, Institute of Aeronautical Sciences; Gill Rob Wilson, president of the National Association, state aviation officials; Charles Horner, president of the National Aeronautical Association; Fred L. Smith, vice-president NAA; Robert J. Smith, past PWA administrator for Texas; and Alton Bell, a representative of Governor Allred.

The Washington group were officially welcomed by Maj. Karl Wallace, field officer for District 7 of WPA; D. L. Johnson, chairman of the C. of C. aviation committee; C. C. Patterson of the C. of C.; Bill Fuller, airport manager; and George Haddaway for Southern Flight.

After a thorough inspection of the airport a dinner was tendered to the guests in the airport coffee shop by the chamber of commerce.

Don Teel has recently opened an office in the administration building in connection with his Beechcraft sales work and charter flying. Of late Don has been devoting considerable night flying to transporting the relatives of motor accident victims to their loved ones. Twice in the past month he has been called out on such an emergency.

Pop Hotchkiss continues his stride in used plane sales and for the past month has sold a J-5 Travel-Air, J-5 Stinson Reliant, two Aeroncas and a Monocoupe. He and Mrs. Hotchkiss made an air trip to Tyler on October 10th to attend the Rose Festival.

Frances McDonald crawled out of the Beechcraft the other day to find that he had bats in his wing tip. The birds had crawled into the wing through the opening around the aileron fitting.

To date Ed Ritchey has soloed five students on his new Arrow Sport airplane and sold three ships. Among his new students are Lee Thomas, L. E. Glass, George D. Key Jr., Alvin E. Lowe, Sam Lane Jr., M. C. Senter and Stewart Morgan, star of Casa Manana. George Key flew to Lincoln with Richey and piloted the new Arrow home.

L. P. French is rolling along nicely with his motor and airplane repair service. He has just completed an extensive overhaul on the Wasp on Swede Rhenstrom's Lockheed. He has also been authorized to do Beechcraft service work.

Craton Guthrie is finding few idle moments since he began instruction work on his new Taylorcraft. He has flown more than sixty-five hours during the past three weeks and signed up ten hard working students. He has soloed three to date and has three more that are about ready.

Reg Robbins had a full load for a charter trip to the Baylor-T. C. U. game last week-end. From Paducah he took Mr. and Mrs. Walter Renfro to Waco. Later he picked up a party of three from Fort Worth and made another hop to Waco. After returning his passengers home, Renfro and another friend decided to make a hop into New Mexico and this lasted for another three days.

Carl Wooten, sales manager for the Taylor-Young Aircraft Co., flew into the airport via Braniff recently to pay a call to Don Teel, local Taylor-Young dealer, and Craton Guthrie.

Joplin, Missouri

By Helen Harper

American Airlines has scheduled two stops daily at Joplin as soon as the new hangar and waiting room are completed. We expect the work

to be finished in about two weeks.

H. G. Harper has finished his stone repair shop and has facilities arranged to provide service for transient pilots as well as airplane and engine repairs and overhaul. He also has several rebuilt licensed airplanes in his hangar. At the present time he is rebuilding a Fleet which he recently purchased in Kansas City.

A little friendly rivalry among our local pilots has resulted in a weekly contest as a test of flying skill. In the last event Homer John, who has not flown for nearly a year, proved himself proficient by winning the bomb throwing honors, and H. G. Harper made a perfect dead stick landing. John Carien, our doodle who took 32,000 volts of electricity and lived, is sponsoring next week's contest. It will very likely be quite interesting.

Frank Wallower, Jr., manager of the Southwestern Missouri Railway, is having a complete overhaul on his cabin Waco. With the ship tied up he is having a hard time keeping his feet on the ground and had to relieve the tension by renting a Cub and going for a hop. Dr. B. E. DeTar is handling the Cub as accurately as the scalpel and will come up for his private license next month. Merle Carpenter visited Kansas City last week and flew his little experimental plane.

Don Mayes still has his Monocoupe at Carthage but plans to be in Joplin as soon as storage is available. Everitt Dyer has had his Monocoupe painted red and together with Harry Adams is taking advantage of the fine Fall flying weather. The next four years will be an eternity for twelve year old Harper, Jr., who has 25 flying hours to his credit now.

Lafayette, Louisiana

By Kellah Hutchinson

Leo Gros is negotiating with the de Funtes Air Craft Enterprise, Inc., at Shushan Airport, New Orleans, for a Cub on which he expects to take delivery within the next two or three weeks. He expects to promote a flying school at the local port and will act as sales representative in this district.

The Evangeline Chapter of the N. A. A. will combine the November and December meetings into a special session which will be held on December 17th, the anniversary of the first flight by the Wright Brothers. The October regular meeting was held at the Oak Grove Club on the 28th and a good meeting was rounded out with an excellent dinner.

Mr. D. Q. Boorthe, from Shushan Airport, was a visitor here over the week-end and had a successful stay while demonstrating his Cub to several of the local pilots as well as carrying several passengers.

S. F. Travis, engineer for the Department of Commerce, and Douglass Langstaff, state aeronautical director, came from New Orleans to confer with the local airport commission. They were interested in getting the airport program approved for WPA sponsorship and were pleased with the cooperation given them by the commission.

Leo Bulliard of St. Martinville and Irwin Richardson of Thibodaux are back in town and preparing to take the tests for a transport license. Ted Colbert, accompanied by his pilot, W. P. Ramsey, stopped at the local port for a short time recently. Harry Watson and Louis Lens, of Lake Charles, dropped in for a brief stay a short time ago. Field Manager Charles Fortun participated in the Navy Day celebration in New Orleans and had a very good time. W. B. Herndon, of Shreveport, stopped here for a short time on a recent Sunday while on a campaign tour through the Evangeline Territory.

Memphis, Tennessee

By Marshall J. Smith

When work under construction is completed, Memphis, Tenn., will have a million dollar airport that will rank with the finest in the country, according to G. D. Albrecht, manager of this municipally-owned flying field.

A WPA modernization project involving the expenditure of about $600,000 is rapidly being rounded out with the erection of a $90,000 new administration building. This four-story structure of reenforced concrete will house administrative offices, serve as ticket office for the airlines and have space for the Department of Commerce and Post Office Department, the U. S. Weather Bureau and other facilities. The fourth story will be a traffic control tower. Officials expect to move into this new building about March 1.

Back in 1928 when no one ever expected a depression and there were two chickens in every pot, Mayor Watkins Overton of Memphis named an airport commission of business and professional men to study an airport for the future. There were then two small commercial fields offering service to barnstorming flyers who kept alive interest in flying through stunts in tank-town cow pastures. Much credit is given in Memphis to those pioneer flyers, many of whom were former war-time pilots who carried on for aviation when it seemed that enthusiasm would never come from commercial companies.

Memphis' airport commission studied ports in other cities and recommended the present site for future development. It was nine miles from the downtown section and in reality in was just 202 acres of poor cotton land.

There were critics who termed the site "silly" and others who called it "a folly," but the vision of the city government in those days of development has now proven its worth. Though the depression came and the chickens flew out of the pot, Memphis went ahead with its determined plan to build to meet the increasing needs of aviation.

Now the land is owned by the city and more fields have been added, graded, and terraced. Today there are 342 well-drained acres in the Memphis Airport, and criss-crossing the flying field are three paved runways, one of which is a mile long.

As far back as 1930 Memphis' airport was well lighted, but today an airport attendant can throw switches that light up banks of lights at the end of each runway that will take a frown off a pilot's face. Three units of lights each with 3000 watts can make the runway look like a show window on Christmas Eve.

American Airlines and the Chicago and Southern Air Lines serve Memphis with east and west and north and south service with 10 planes arriving every 24 hours. Traffic figures for 1937 indicate Memphis will have cleared about 28,000 pasengers.

In addition to the commercial ships, Memphis Airport facilities are used by about 75 private ships a month and about 100 government planes.

Every encouragement possible is given to the student flyer. Right now there are three flying schools at the airport. They are: Southern Air Service, Memphis Flying Service and Mid-South Airways. All have a full quota of cub pilots. A total of about 175 students are now learning to fly at the Memphis port.

High praise came this month from visiting WPA officials from Washington, but it is the day-in-and-day-out service, the courtesy of the attendants, and the progressive spirit of the city government which makes Memphis Municipal Airport a safe harbor for any ship.

Miami, Florida

By Karl E. Voelter

Plans are well toward being shaped up for the coming air meet which promises a real tenth anniversary show with all the trimmings. There will be open and closed races for both Free For All and "C" licensed aircraft. The whole marine air force from Quantico will be here and that in itself will be a show. The races this year will extend through Sunday, December 5th, after which it is planned to have the Miami-Havana Race. At the present time nothing really definite has been worked out for the latter event. However, your correspondent believes that there is little doubt that this event, so famous from the success and interest it aroused last year, will again be put across in real bang-up style.

We hear all sorts of rumors about various "On to Miami" tours and have assurance to date that Cub, Taylorcraft and Aeronca will all have caravans to the meet. At this writing Cub promises a minimum of 200 ships and Taylorcraft says 150 of their planes will be represented. Aeronca hasn't made any claims but we know they will have a large delegation on hand. In addition there will be a cruise from California with many celebrities whose names we are not permitted to divulge at this time. This cruise will really be an outstanding one and will include an array of high priced airplanes.

From Trenton we have word from Don Luscombe himself that he expects to be at Miami with one of his new small airplanes powered with a Continental "50." If this little job is as good as Don says it will be, the aviation world will certainly give him a heavy welcome.

J. (Jerry) V. Dack blew in the other day with one of the single

(Continued on Page 26)

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FOR SALE: WACO F Warner 125 hp. Licensed until November, 1938. New tires, brakes, starter, all necessary instruments. 50 hrs. since complete major on ship and motor. Price $1500. R. A. Lyle, Box 86, Central Park Station, Houston, Texas.

FOR SALE: SWALLOW Special Model H Wright J-6-5. Licensed. Landing and navigation lights, air wheels, turn bank, compass, speed ring. Ship may be seen at Arkansas City, Kansas. Price $1,100. Late model automobile accepted. B. R. Smith, Route 3, Winfield, Kansas.

FOR SALE: Late 1937 Master ARROW SPORT V-8. Special paint job, navigation lights, dual controls, brakes, tail wheel. Private ship like new. $1,450. Max Walton, 310 South Broadway, Wichita, Kansas.

FOR SALE: WRIGHT J-5 engine. Eclipse hand starter, Standard Steel prop, Townend ring cowl and mounting brackets. $500. Gene Rawdon, 1247 S. Waco, Wichita, Kansas.

WANTED: Good used CUB or TAYLORCRAFT. State price and condition. L. S. Byrd, 838 Monroe St., Fort Worth, Texas.

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AMERICAN EAGLE, Kinner 100. Just re-licensed and A-1 ..... $450

BEECHCRAFT 1935 Model B17L. Jacobs 225 hp. Total time 580 hrs. 125 hrs. since motor major. Complete blind flying instruments, RCA radio receiver and transmitter, landing lights and flares $4500

WACO F-3 Jacobs 225 hp. 3 place open. Total time 530 hrs. 65 hrs. since motor major. Dual controls, complete blind flying instruments, Westport radio, rear cockpit enclosure. Heywood starter-generator, licensed to Feb., 1938, equipped with Scintilla magnetos $2500

WACO Model Wright 175 hp. Motor modernized with no time since major. Dual controls, Bendix wheels-brakes. Licensed to October, 1938 ..... $1000

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1-HAMILTON STAN. prop. Fixed pitch, dia. 8' 6" Hub 5406, Blades AcAl. Suitable for 450 Wright E3 or SB Wasp 250.00

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1-New FAHLIN wood prop for L-4 Jacobs 90.00

INSTRUMENTS

1-PIONEER No. 355 altimeter 12.00

5-PIONEER No. 718B compass, ea. 12.00

1-PIONEER No. 356 compass 10.00

1-PIONEER No. 625B drift indicator 20.00

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1-WRIGHT No. 44314 crankshaft assembly 100.00

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1-WRIGHT No. 11532E oil thrower front bearing 4.00

1-WRIGHT No. 47889 automatic valve oiler and tube assembly 6.50

4-No. 2095-L-4 automatic valve lubrication hose and fitting assembly over cylinder 2.00

2-JACOBS No. 483 ballast resistance unit 12.50

1-JACOBS No. 566A Breeze S. P. shield 2.00

1-PACOBS distributor cap head (shielded) 1.25

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1-ECLIPSE vacuum pump No. M2932D 10.00

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1-CB97 JACOBS control box 45.00

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2-AEROL type PCJ shock struts ... 25.00

8-Landing gear latch control assembly (Shakespeare), each 1.50

1-1½ qt. Master Super FYR-FYTER Extinguisher 10.00

1-ACE Fire Extinguisher — pressure type 25.00

5-Dumore motors—gear ratio 5-1 (Used) 10.00

1-Mod. 6000 Stabilizer—complete uncovered (Travel-Air) 25.00

1-Mod. 6000 Fin uncovered (Travel-Air) 15.00

1-Mod. 6000 Rudder uncovered (Travel-Air) 15.00

1-Mod. 6000 Elevator complete uncovered (Travel-Air) 20.00

1-Mod. 6000 Firewall (Travel-Air) .. 3.00

4-BEECHCRAFT rubber covered control wheels 2.50

175-No. 336 SFF turnbuckles, each .10

ROUND TIE ROD WIRES—less terminals. New, each ..... .25
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6 Sheets .050 x 36 x 120 17SO Dural sheet, sheet 8.00

1 Sheet .032 x 36 x 120 17SO Dural sheet 6.00

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1-C 103-2" 65" belt—green, each .. $ 2.25

1-C 103-2" 65" belt—red, each 2.25

3-C 103-2" 40" belt—navy blue, ea. 1.80

5-C 103-2" 40" belt—light blue, ea. 1.80

1-C 103-2" 65" belt—golden brown, each 2.25

1-C 103-2" 65" belt—navy blue, ea. 2.25

1-C 103-2" 65" belt—light blue, ea. 2.25

5-C 103-2" 40" belt—red, each 1.80

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2-Sheets Plexiglas 31½ x 31 x .195, almost new, each 25.00

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Write for complete list including many other bargains.

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PORTERFIELD DeLuxe—LEBLOND 70 hp. Brakes front and rear. 250 hrs. total time, 10 hrs. since major $1,000

K. R. FAIRCHILD—Motor completely rebuilt with new front, main, rear case, new pistons, new cylinders. Motor and ship rebuilt at approved shop. Air wheels $1,000

WARNER STINSON—Being rebuilt at present time. High gloss finish. Ready for delivery Oct. 22 ..... $1,150

LAIRD J-S—Speed ring. Just re-licensed $1,350

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Practically new SIDI shaft with master rod and bearing.

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TAYLORCRAFT demonstrator with less than 100 hours. Never damaged. Equipped with brakes, tail wheel and compass. Price on request.

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Ports of Call

(Continued from Page 23)

engined Ford transports on a shakedown flight from California. After a few local shakes he is going back to Brownsville, Texas, from which point he will start across to Columbia, S. A., where the Sanabria Mines, Inc., will use the ship as a freighter in their work. Jerry overhauled a B-5 Bird not long ago in Miami for the same concern. It is in operation down there now. Dack will be chief mechanic and pilot for the company. He says it is impossible to use any other transportation than by air where they are operating.

San Antonio, Texas

By Greg Moore

Two weeks ago another spot landing and bomb dropping contest was held for the Harmon Trophy. To take this award a pilot must win three times. The last event was the sixth contest and to date George Vordenbaum and Eddie Smith have each won twice. Albert Utz and Stanley Hall are one-time winners. Although the competition is primarily for students it is open to all interested in flying.

Julian Myers, one time chief instructor at the Sparton School of Aeronautics at Tulsa, has organized a ground school at the local Tech High School. The classes are held twice a week for two hours and are open to anyone. The school has an enthuhiastic enrollment of about forty students.

Sunday, October 24th, Hangar Six held another flight breakfast. On this occasion there were ten people on the flight to Seguin, a distance of about thirty miles. Breakfast was served at the Red Mill, a local eating establishment, and after a short visit around town, the group returned to Stinson Field about ten in the morning. Those who made the flight were: Col and Mrs. J. H. Lapham in a Stinson, Slats Simmons in his Ranger, and Stanley Hall, John Frost, P. H. Hebert, Joe Frost, Jr., Mr. and Mrs. Albert Utz and Bill Beck flying four Cubs. Everyone had a swell time and it is expected that another of the breakfasts will be held soon.

Hangar Six signed two new students this month. One of them is R. C. Sheffield, member of the local police force, and the other is C. E. Kline, adjustor for the Aetna Life Insurance Co. Both are making splendid progress.

United Aero enrolled four new students including Jerry Sterling, station operator for Gulf, William Pfeil, who runs a model airplane shop, O. L. Dockery and James E. Smith, the latter two being on duty at Dodd Field.

Wichita, Kansas

By Alanson Rawdon

A state meeting of pilots and operators was held here November 4th under the auspices of the local N. A. A. Chapter. There was a good turnout for the session which was supplemented by a dance given by the Women's Aeronautical Association of this city.

The meeting was called for a discussion of the new Bureau of Air Commerce regulations. Needless to say there was some heated comment, some of it favorable but most of it was not.

One of the most severe rulings is that which grounds all unlicensed airplanes within the airline zones. Under the provisions of this decree none of the ships can be flown to another field away from the airline and all this has taken place without any warning or notice. The bureau has announced that any pilot who does fly his ship out will be apprehended and prosecuted. Such is the attitude of a government department which never issued any definite information on rulings until after they came into force.

The Harte Flying Service, located for the past three years in the hangar on the east side of the municipal airport, has sold the building and moved their office to the municipal hangar. Flying equipment and student work will be carried on from there while a shop is being set up down town to handle airplane and engine overhaul and construction.

Flying weather has been very good for the past month here and most everyone has been in the air. The country is now quite beautiful.

Jacqueling Cochrane recently flew her Wasp Beechcraft to the Beech factory. She was accompanied by her pilot, Jim Drummond. Jackie took a plane on west to her home while Drummond flew the ship to Chicago later after it had been checked over.

Monty Barnes stopped in at the local port for a few days recently. He is now flying for the Woltz Studios on photographic work and took his ship to the Des Moines headquarters of the company.

Opie Swope and Jim Postlewait recently returned from a demonstration trip which took them through Oklahoma and Texas. Considerable interest was taken in the new Swallow airplane at the various airports that they touched at.

Major Ennis Whitehead stopped here for the night recently. He was flying a P-12 fighter and is now stationed at Leavenworth, Kansas. Whitehead has been a familiar figure around here for the past ten years and is well known.

Lambert Projection

(Continued from Page 9)

1:500,000 scales together with a protractor and lines for paralleling other lines.

To Measure the True Course on a Lambert Chart

IN order to understand clearly the problems involving directions it is important to distinguish carefully between a course and a bearing (or azimuth). Figure 2 illustrates the difference between these terms as well as the methods of measuring courses and bearings on the Lambert or polyconic projection between any two points A and B. Referring to the figure:

Angle *a* is the course to be followed from A to B;

Angle *b* is the course to be followed from B to A;

Angle Z is the bearing or azimuth of B as measured at the point A;

Angle Z′ is the bearing or azimuth of A as measured at the point B.

It should be noted, further, that on the Lambert projection a course is always measured at the meridian nearest halfway between the two points in question; a bearing (or azimuth) is measured at the meridian through the place at which the bearing is determined or to be determined.[1]

Both courses and bearings are measured clockwise from the north, from 0° up to 360°.

A course may be followed without change for the entire distance between the two points (if, for the moment, we disregard magnetic variation, compass deviation and wind); a bearing (or azimuth) is constantly changing as we progress along the route and is different at every point thereon (except for the special cases in which the two points are both on the same meridian, or are both on the equator).

Courses are used continually in all problems of dead reckoning; the use of bearings (azimuths) is confined to radio navigation and celestial navigation almost exclusively.

The terms "bearing" and "azimuth" are identical, but the former term is generally used in radio navigation, the latter in celestial navigation.

If a course between two points is mistakenly measured as a bearing, with the initial meridian instead of with the meridian nearest halfway, considerable error may result.

To clear up any confusion that may yet remain, it should be explained that when the course is measured with the meridian nearest halfway (as the angle *a* Fig. 2), a plane following that course will not exactly follow the straight line AB on the chart but will slightly depart therefrom near the middle of the route, as indicated by the light broken line (greatly exaggerated) in Fig. 3.

Steel Cleats

(Continued from Page 13)

Dual 10 tread, designed for maximum traction on wet, slippery or snow-covered runways. No tires have yet been developed which will provide sure transaction on or adhesion to sheet ice, whether on airplanes or motor cars.

Air Corps engineers are now studying and analyzing the results of the steel cleat tests which were carried out at Selfridge Field, Michigan, under the direction of Colonel Walter H. Frank, commander of the cold weather equipment test group. Further development work of cold weather equipment is now being carried on by the Materiel Division of the Air Corps at Wright Field, Dayton.

[1] For the theoretical precision, long courses should be measured with the meridian of middle longitude between the points in question, rather than the meridian nearest halfway. This applies only to very long distances, however, and is an unwarranted refinement, the maximum course error from this cause being too small for practical consideration.

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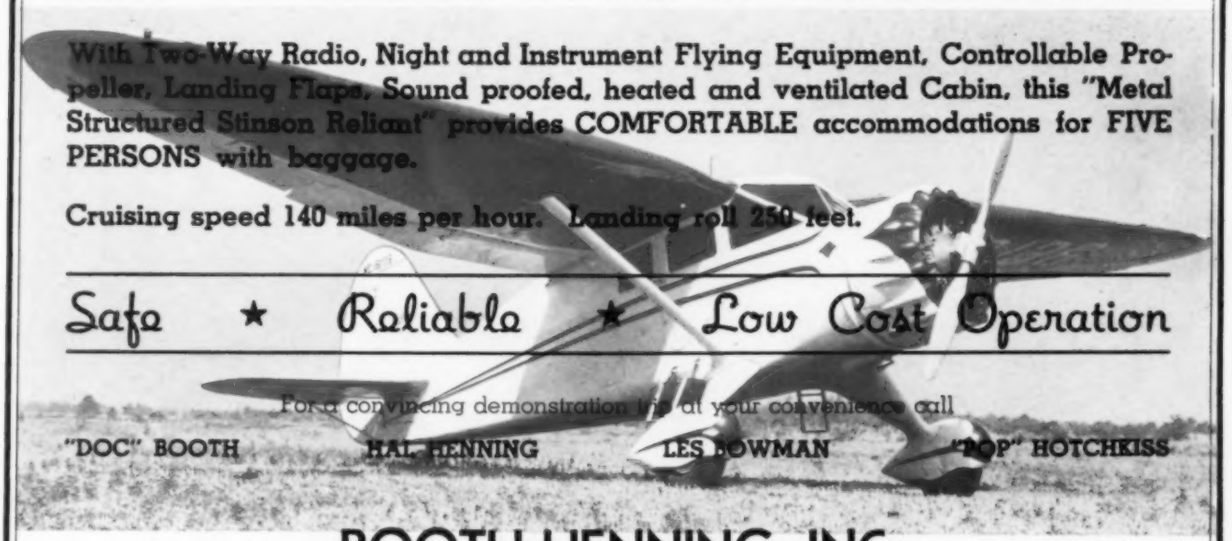

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These airplanes were selected by their owners as the most value per dollar. Beechcraft Airplanes cost less to buy, less to operate, land slower and fly faster than any other ship of the same horsepower.

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2	Robert Lesage	Dallas
2	Robert Glass	Dallas
2	Republic Oil Corp.	Houston
5	Loffland Bros. Drilling Co.	Tulsa
1	National Geophysical Co.	Dallas
1	Kepley Production	Laredo
1	Gypsey Oil Corp.	Laredo
1	Tom Potter	Tyler
1	Oxnard Flying Service	Amarillo
1	S. B. Crabtree	Tyler
1	Robert Murphey	Pampa
1	Yandell Rodgers	Tyler
1	Louisiana State University	Baton Rouge
1	Graham Oil Corp.	Corpus Christi
1	Carle Gasoline Co.	San Antonio
1	Emperor Oil Co.	Fort Worth
1	Burrus Milling Co.	Dallas
1	English Freight Lines	Houston
1	Barney Cockburn	Arp
1	Leonard Truck Lines	Shreveport
1	King Drilling Co.	Wichita Falls
1	MeTex Oil Co.	Hobbs
1	Wilcox Oil Co.	Tulsa
1	Noble Drilling Co.	Ardmore
1	Schlaet Oil Co.	Fort Worth
1	Jones-Spicer	Oklahoma City

Phone or wire for demonstration

Harry A. Hammill ★ **D. M. (Don) Teel**

Austin, Texas **Fort Worth, Texas**

THE FIRST TAYLOR "CUBS" WERE GOODRICH EQUIPPED

BORN IN 1931 AND STILL GOING STRONG

The second Taylor Cub, built in 1931, and Goodrich-equipped for safety. Called "No. 13" in defiance of superstition, this plane helped 70 flyers to obtain pilot's licenses, including two who were "flying grandfathers" . . . With 3000 flying hours to its credit, the veteran "No. 13" is still faithfully serving its owner.

. . . AND TAYLOR HAS CHOSEN GOODRICH EVER SINCE!

FROM THE very first days of the Goodrich-equipped Taylor "Cubs," the popularity of this plane has grown by leaps and bounds. Starting with 5 built in 1931, popular demand pushed production of these trim, low-cost ships to 20 a week last year. 550 were sold in 1936 alone and production is still climbing!

And no wonder. Taylor Cubs offer speed, comfort, SAFETY—the safety for example of "sitting down" at 28 miles an hour. And, adding the final element of safety needed by all planes, Taylor equips with Goodrich Low Pressure Silvertowns. Thus Taylor owners have more protection, more smoothness for every landing and take-off.

Goodrich "Fills the Bill" In Every Aviation Need

No matter what size planes you build or fly—whether light sport planes or giant transports—Goodrich has tires and over 40 other aviation products that will give you *extra* safety, efficiency and comfort. Remember, when you specify Goodrich you automatically get the benefit of experience in aviation that has caused the leading air lines, pilots and plane makers to equip with Goodrich. See your nearest Goodrich dealer or write to Dept. 648 Aeronautical Division of The B. F. Goodrich Company, Akron, Ohio, for complete information about Goodrich Airplane Silvertowns and other Goodrich Aviation Products.

TAYLOR CUB—1937 MODEL

New and improved with many more safety and comfort-giving features, the new Cub is an all-weather, all-year plane. Using only 3 gallons of gasoline per hour and little oil, these planes actually cost less to run than a popular-priced car. And because Cubs are "safety-protected" with Goodrich Airplane Silvertown Tires, landings are safe, sure and smooth.

THE 1000th CUB . . . being delivered to Blevins Aircraft Co. of Atlanta, Georgia, during the 1936 Miami Air Races. This scene recalled to mind that during 1931, its first year of manufacture, Taylor sold 5 Cubs. In 1934, 70 Cubs had been sold and in 1935 the number increased to 211. By the end of 1936, 550 cubs had rolled from Taylor production lines to their owners. Since this photograph was taken, sales of the popular Taylor Cubs have shot well past the 1100 mark.

Goodrich *Airplane* Silvertowns

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